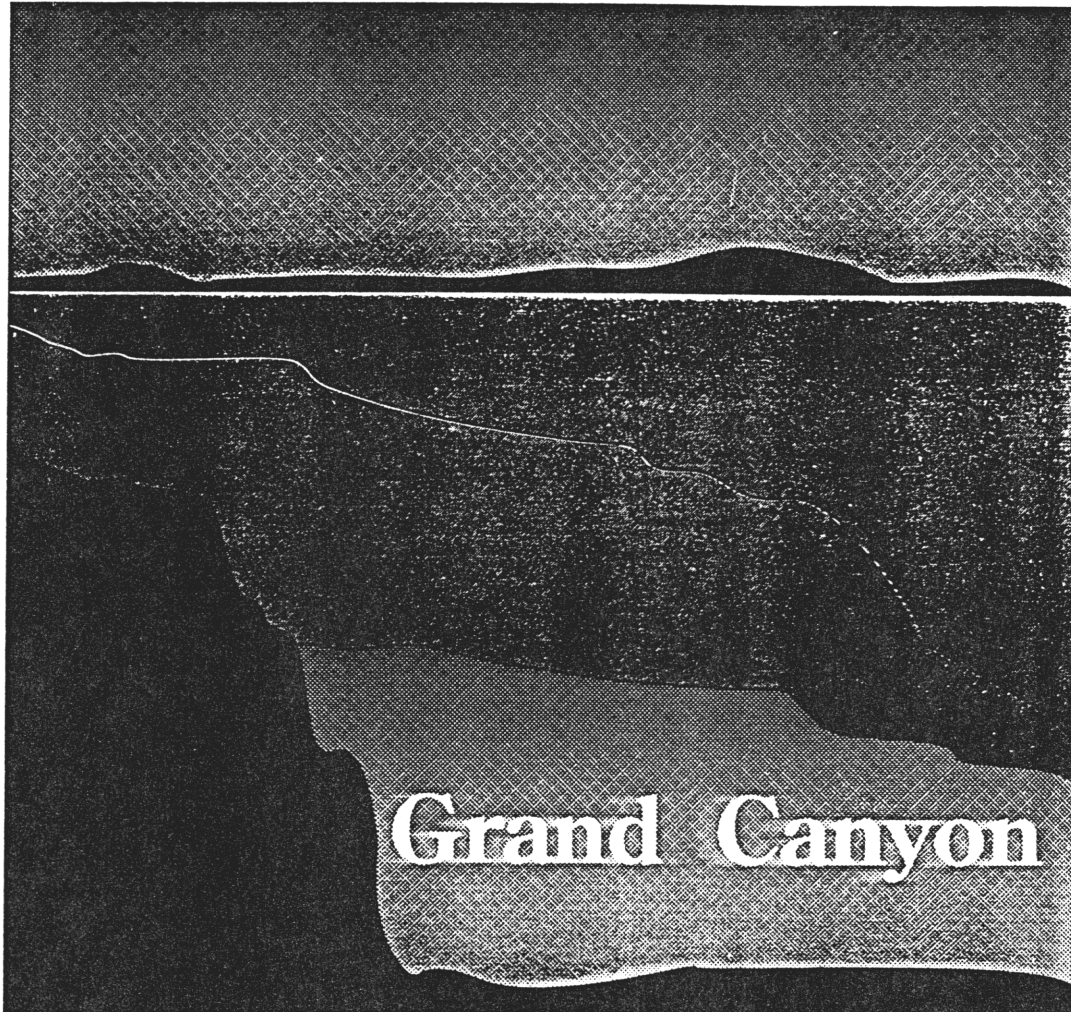


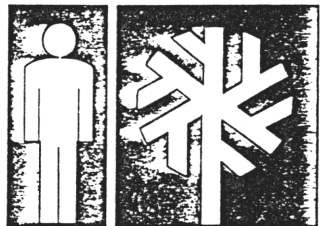
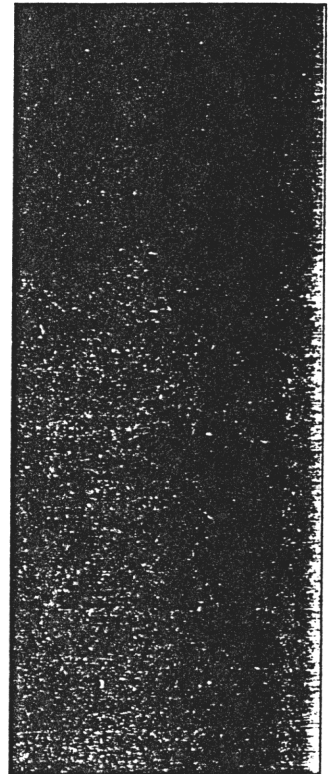
development concept plan
for north rim visitor facilities

draft supplemental environmental statement
to the
final master plan and environmental impact statement

december 1990



National Park • Arizona



**DEVELOPMENT CONCEPT PLAN
FOR
NORTH RIM VISITOR FACILITIES**

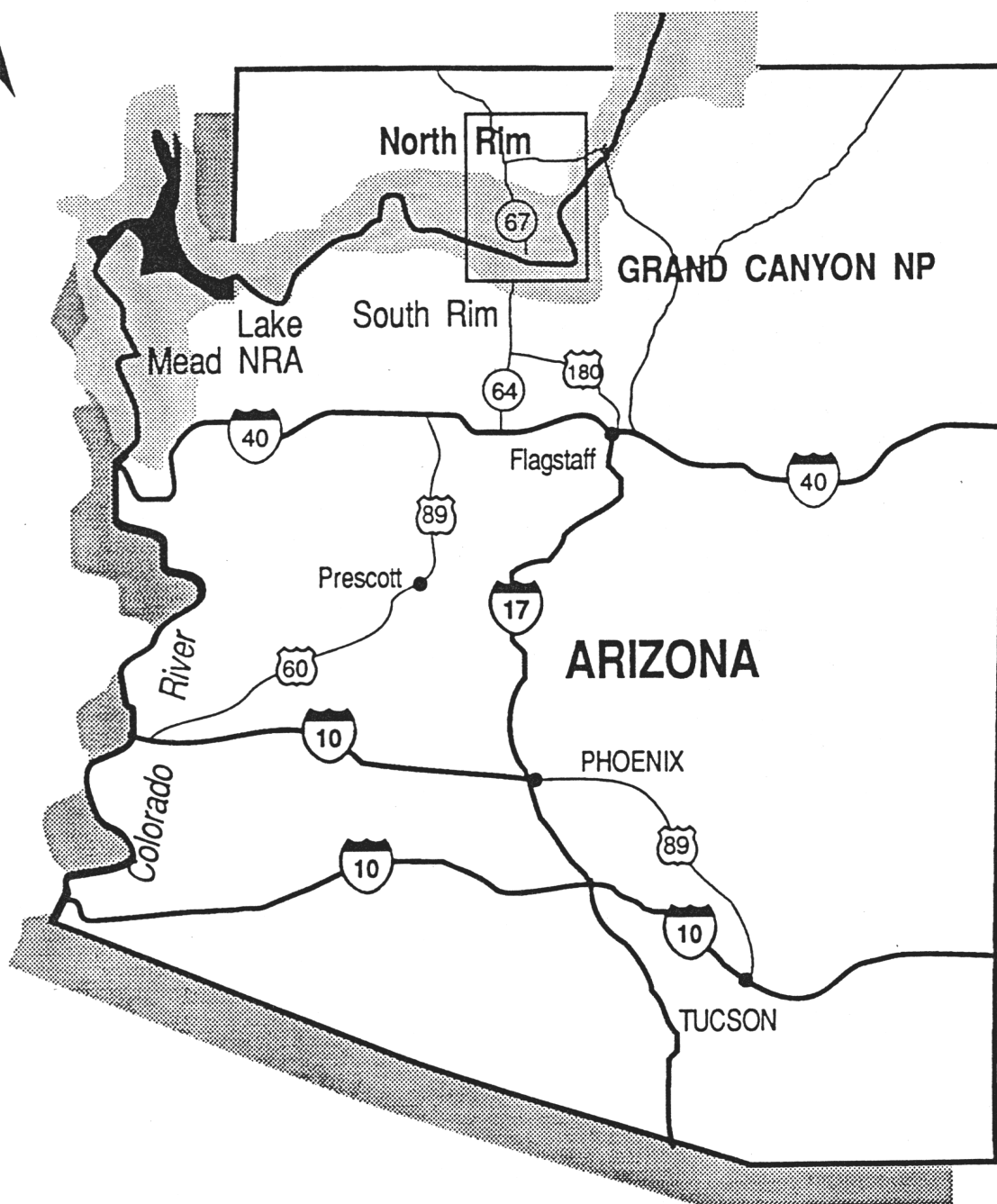
**DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
TO THE
FINAL MASTER PLAN AND ENVIRONMENTAL STATEMENT
GRAND CANYON NATIONAL PARK, ARIZONA**

This development concept plan and supplemental environmental impact statement examines the various levels of visitor services that could be provided at the North Rim of Grand Canyon National Park along with the associated environmental impacts. Five alternatives are examined including (1) no action -- the current levels of overnight use accommodations would be maintained and all support facilities essentially would be maintained in current conditions except for minor health and safety improvements; (2) additional lodging, in motel type units, and camping units would be provided along with improvements in parking, circulation and other support facility improvements; (3) additional lodging would be provided in cabins with camping additions and other improvements as described in (2); (4) additional camping units only would be provided along with the improvements in traffic and other support facilities as described for (2); and (5) traffic and circulation improvements only would be made in the North Rim developed area. The major environmental issues addressed deal with impacts on natural resources, historic resources, visitor use/experience, park operations and on the visitor use planning for adjoining lands on the Kaibab National Forest.

Comments on this supplemental draft environmental impact statement should be received no later than March 29, 1991, and should be submitted to:

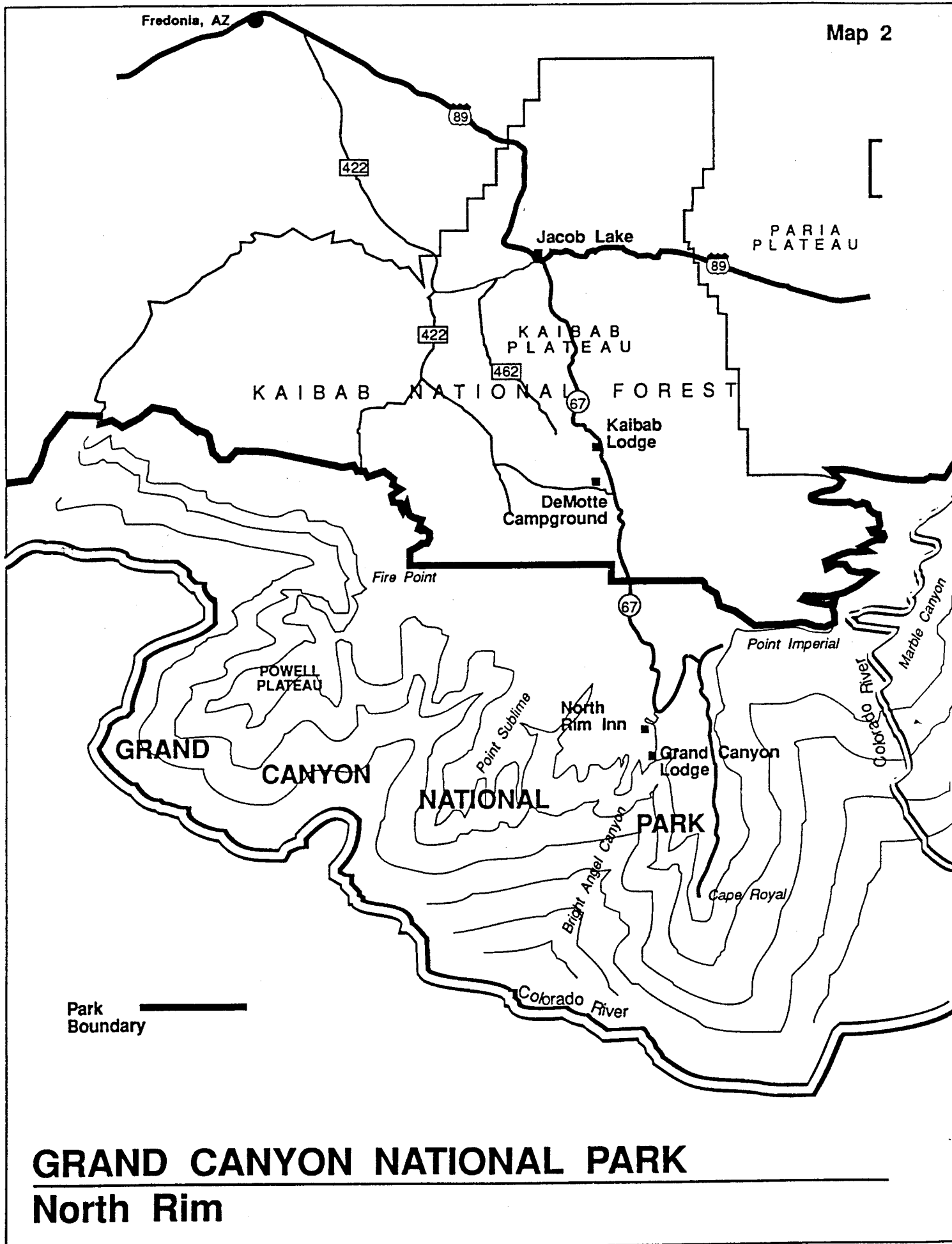
Superintendent
Grand Canyon National Park
P.O. Box 129
Grand Canyon, AZ 86023

For additional information, please contact the park at the above address or at telephone number (602) 638-7708.

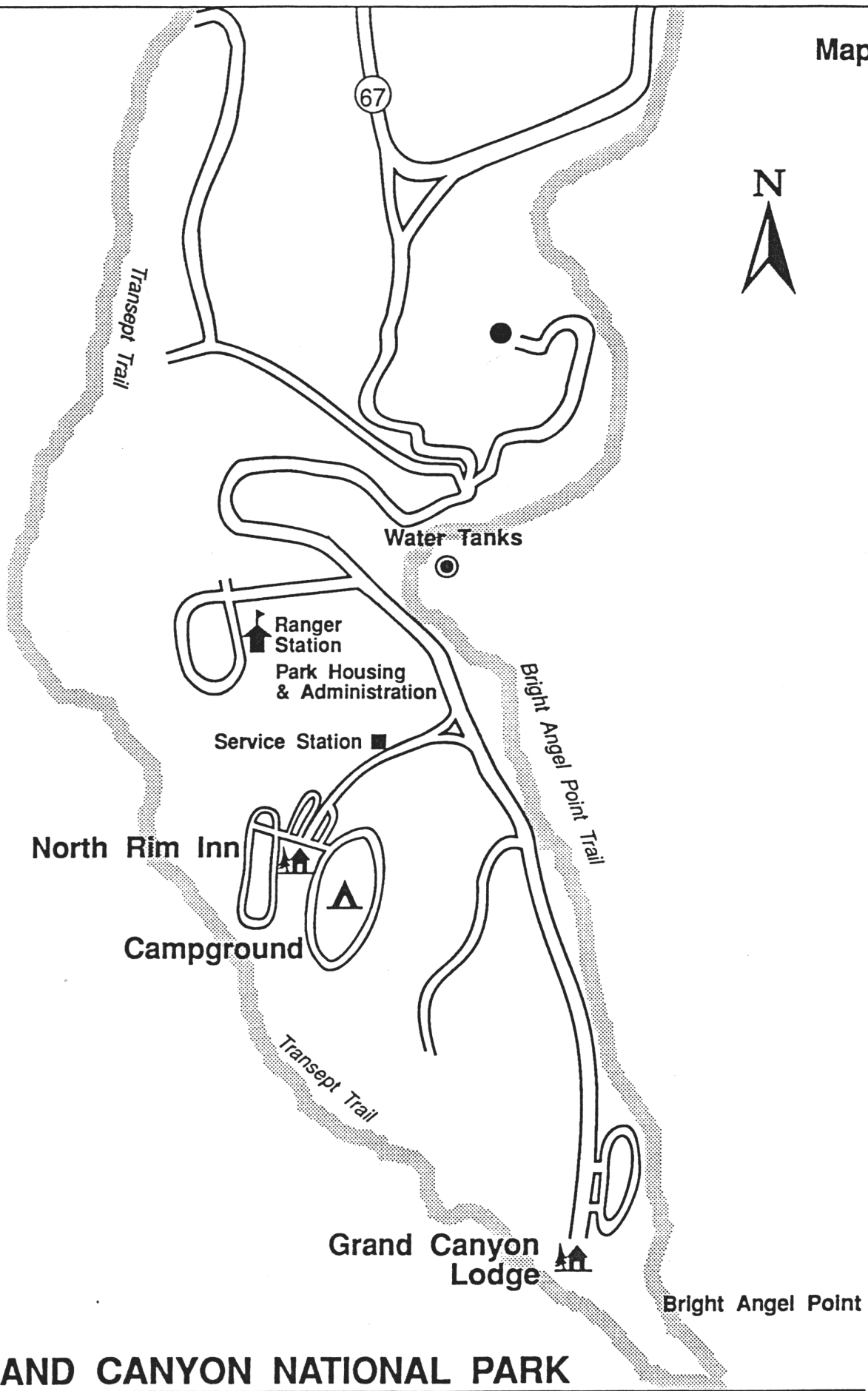


THE REGION

Grand Canyon National Park

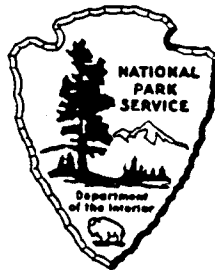


Map 3



GRAND CANYON NATIONAL PARK
North Rim Developed Area

SUMMARY



SUMMARY

This Draft Supplemental Environmental Impact Statement and Development Concept Plan has been prepared to provide a more concise interpretation and definition of visitor services for the North Rim, Grand Canyon National Park, from that set forth in the 1976 Master Plan and Environmental Statement for the park. The major issue is the number of lodging and camping units, along with associated support facilities, that should be provided at the North Rim. Also taken into account in addressing this issue is the recent planning efforts of the Kaibab National Forest on the provision of new lodging and camping facilities on the neighboring North Kaibab Ranger District. For this reason, the Forest Service is a cooperating agency on this plan and supplemental environmental statement.

Planning for additional visitor services for the North Rim, Grand Canyon, was initiated in 1975 and limited definitions and prescriptions for future development were contained in the 1976 Master Plan. In 1982, a comprehensive design plan and environmental assessment were prepared for the area but the plan was not implemented. In 1988, a development concept plan and environmental assessment were prepared and circulated for public review but this plan was not implemented due to legal action. This supplemental environmental impact statement draws from and references these past planning efforts.

The alternatives identified and analyzed are:

Alternative 1, No Action: The existing 201 lodging units and 83 campsites, with support facilities, would be retained with no modifications. The existing roads and parking lots serving the North Rim Inn and Grand Canyon Lodge would remain unchanged.

Alternative 2, The Proposal, North Rim Inn Lodge: A 100 unit lodge, comprised of a pair of two story structures, would be constructed in the vicinity of the North Rim Inn. An 80 unit lodge variation is examined to compare with the cabin lodging option covered under Alternative 3. Also provided would be a new restaurant and a 50 unit expansion of the existing

campground. In addition, traffic improvements would be made at the Grand Canyon Lodge, North Rim Inn and within the existing campground.

Alternative 3, North Rim Inn Cabins: The new lodging would be contained in 20 fourplex cabins for a total of 80 new units. A 25 cabin variation (100 units) is examined to compare with the 100 lodge units proposed under Alternative 2. Expansion of the campground, provision of a restaurant and traffic improvements would be identical to Alternative 2.

Alternative 4, Campground Expansion Only: Under this alternative, the campground would be expanded by 80 units and the overnight lodging would remain static. Traffic improvements would be identical to Alternative 2.

Alternative 5, Traffic Improvements Only: There would be no expansion of either lodging or camping facilities. Only the traffic improvements described under Alternative 2 would be undertaken.

Adoption of any of the above-described alternatives would constitute an amendment to the 1976 Master Plan. Only Alternative 4 approaches a clear provision of the 1976 plan, that being to expand the existing campground by up to 100 units.

Alternatives considered but rejected for further analysis included location of the lodging at upper Transept Canyon, reuse of existing cabins at the North Rim Inn site, removal of all structures from the North Rim developed area, replacement of existing small cabins adjacent to the Grand Canyon Lodge with larger lodging units, and location of the campground and lodging more remote from the rim area but within the park.

Impact topics evaluated include wildlife, vegetation and soils, threatened and endangered species, aesthetics, water resources, air quality, historic and archeological resources, visitor use, park operations and utilities including water supply, sewage treatment and electrical. Cumulative impacts and unmitigated adverse impacts also are identified. In addition, to the extent possible based on current information, the affect of the alternatives on the development plans of the adjoining Kaibab National Forest is evaluated.

SUMMARY OF ALTERNATIVES AND MAJOR IMPACTS

ALTERNATIVE 1 - NO ACTION

Natural Environment

No new impacts to natural resources will occur from construction or other displacement. Without modifications to campgrounds, some short and long term adverse impacts may accrue to soils and vegetation due to overuse. There will be no impact to water resources or changes in the visual appearance of the area. Long term degradation of visual qualities, plant and wildlife values and air quality may occur from increasing numbers of day users in an already congested environment on peak use days.

Cultural Resources

The historic districts and associated structures will not be impacted, at least over the short term. Visitor congestion can detract from the historic scene. There will be no impacts to archeological resources.

Socioeconomic Environment

Current visitor experience at the North Rim will be preserved. Competition for existing lodging and campsites will be keen with the alternative of seeking lodging and campsites on existing or new facilities on the adjoining national forest or elsewhere. Normal increases in day use will be compounded by the influx of users of new lodging and camping facilities outside the park. Existing traffic congestion, particularly at Grand Canyon Lodge, will worsen and competition for limited food services will increase. The water and sewage systems will be able to handle increased day use loads but some renovation of the water system is advisable to improve efficiency and reliability.

SUMMARY OF ALTERNATIVES AND MAJOR IMPACTS (CONT.)

ALTERNATIVE 2 - PROPOSAL, NORTH RIM INN LODGE

Natural Environment

Approximately 3.6 acres of wildlife habitat and soil will be disturbed. Approximately 560 trees, of which about 8% or 44 trees are mature (24 inches diameter and over), will be removed for both the campground and lodge. Revegetation and prudent design may reduce some of this impact but loss of mature trees cannot be mitigated. Major visual changes will occur in the North Rim Inn area from the introduction of two story motel units and a restaurant. These structures will not be visible from the Grand Canyon. Visual benefits will accrue from traffic improvements at both the Grand Canyon Lodge and North Rim Inn. Air quality may suffer slight impairment from increased use in the North Rim Inn area and improvement in the Grand Canyon Lodge area from alleviation of congestion. There will be no impact to floodplains or wetlands and no additional impact to the raw water source. There will be temporary impacts to air and visual qualities during construction. The alternative use of an 80 unit lodge plan, versus the 100 unit proposal, would reduce soil and wildlife habitat impact by about .2 acre, result in about 30 less trees removed and have no significant difference in visual impact.

Cultural Resources

The historical scene and, to some degree, the use of the North Rim Inn area will be altered permanently by the new lodging development. The North Rim Inn and adjoining four cabins will be restored and both the Inn and Grand Canyon Lodge will be enhanced by traffic improvements. There will be permanent loss of historic structures (the employee frame cabins at the North Rim Inn). There will be no impact on known archeological resources. Use of the 80 unit lodge variation will have no additional affect, positive or negative, on cultural resources.

Socioeconomic Environment

The current visitor use experience at the North Rim Inn complex will be altered. It will meet with disapproval by some users and approval by others. Addition of the new lodging has the potential to reduce the current number of day use trips to the park, allows more visitors to experience

SUMMARY OF ALTERNATIVES AND MAJOR IMPACTS (CONT.)

ALTERNATIVE 2 - PROPOSAL, NORTH RIM INN LODGE (CONT.)

the Grand Canyon over a 24 hour period and can accommodate a wider variety of visitor needs. It also allows a balance between the adjoining national forest and park by avoiding concentrated use areas and allowing national forest facilities more latitude to serve forest users. The new camping and lodging development would be considered a ceiling on overnight use for the North Rim. The Grand Canyon Lodge area benefits by removal of employee dining and guest registration to the Inn area and from the traffic improvements.

There will be increased demands on the water and sewer systems that can be accommodated through modifications that do not impact park resources. The electrical system is new and capable of accommodating the increased demand.

Park employees will approximate current levels with some increased workload. Concession employees would increase by about 50. Increased workloads will be offset in part by better separation of employee and visitor services and by the traffic improvements. The new lodge structures would provide more efficiency in operation.

Use of the 80 unit lodge variation would not significantly reduce adverse impacts but would reduce beneficial impacts through loss of overnight accommodation opportunity in the park.

SUMMARY OF ALTERNATIVES AND MAJOR IMPACTS (CONT.)

ALTERNATIVE 3 - NORTH RIM INN CABINS

Natural Environment	Approximately 3.2 acres of wildlife habitat and soil will be disturbed and about 600 trees removed for the cabins and campground, including the same number of mature trees as under Alternative 2. While cabins can be "landscaped in" to reduce area of soil disturbance, the total area partially impacted is larger than under Alternative 2 because of the more dispersed nature of the lodging and restaurant development. Visual impacts will be reduced through the use of single story cabins. Otherwise, the positive and negative impacts of the total development are identical to Alternative 2. Impacts on water resources and air quality are identical to Alternative 2. Use of 25 cabins to equal the 100 accommodation units of Alternative 2 would increase soil and wildlife habitat disturbance by .2 acre and require the removal of about 13 additional trees. The development footprint would be extended northward to avoid construction on the rim.
Cultural Resources	While the current scene and use of the North Rim Inn area will be altered permanently by introduction of the new lodging, the detached cabins will reflect the type of lodging structures that historically, were used in this area. All of the frame and log cabins, located north and west of the Inn, will have to be removed immediately to allow for this development plan. There will be no impact on known archeological resources. Use of the 25 cabin variation will have no additional positive or negative impacts on cultural resources. The benefits from the traffic improvements are the same as for Alternative 2.
Economic Environment	Similar to Alternative 2, the current visitor use experience at the North Rim Inn area will be altered with the introduction of the new lodging. However, the use of detached cabins is more in keeping with the historic lodging of the area. The benefits of reducing congestion and achieving balance with accommodation plans on the national forest is reduced from those of Alternative 2. Use of the 25 cabin variation would make these factors identical to Alternative 2. Benefits from traffic improvements in the Grand Canyon Lodge area are identical to Alternative 2. Demands on

SUMMARY OF ALTERNATIVES AND MAJOR IMPACTS (CONT.)

ALTERNATIVE 3 - NORTH RIM INN CABINS (CONT.)

water, sewer and electrical systems are reduced with the 20 cabins and the same with the 25 cabins. Employee numbers, workload and logistical improvements are identical to Alternative 2 except that the need for immediate removal of the 10 NPS employee cabins requires replacement housing be furnished before project inception. The detached cabins will incur increased maintenance costs and loss of efficiency versus the motel type units proposed under Alternative 2. There would further cost increases and loss of efficiency if the 25 cabins were used.

SUMMARY OF ALTERNATIVES AND MAJOR IMPACTS (CONT.)

ALTERNATIVE 4 - CAMPGROUND EXPANSION ONLY

Natural Environment	Approximately 1.6 acres of wildlife habitat and soils will be disturbed and about 467 trees, all of small diameter, removed. The visual appearance of the North Rim Inn area will be altered slightly with the impact confined to removal of cabins formerly used for housing and the introduction of two new camping areas. Temporary visual and air quality impacts will occur during construction.
Cultural Resources	The historic scene and use will be maintained except for removal of cabins formerly used for employee housing and for guest accommodations. There may be a change in use of the Inn through conversion of the former employees lounge to a snack food service. There will be no impact on known archeological resources.
Socioeconomic Environment	The current use pattern at the North Rim Inn would continue with an increase in the number of campers. Persons preferring not or unable to camp would not benefit from this plan and the impacts of not providing additional lodging would be the same as under Alternative 1. Concession and NPS employees would remain about the same with some increased workload for NPS employees. Food service competition with visitors would remain, even with the addition of a snack service at the North Rim Inn. Water and sewer system demands would be less than under Alternative 2 but would still require modifications to meet the increased campground demand.

SUMMARY OF ALTERNATIVES AND MAJOR IMPACTS (CONT.)

ALTERNATIVE 5 - TRAFFIC IMPROVEMENTS ONLY

Natural Environment

There will be negligible loss of wildlife habitat and soil disturbance. About 119 trees, all small diameter, will need to be removed to allow for traffic median redesign. There will be short term and minor visual and air quality impacts during construction. Potential impacts from long term increases in day use would be identical to Alternative 1 except that current congestion would be relieved, at least over the short term.

Cultural Resources

Impacts would be identical to Alternative 1 except that some positive impacts will accrue to both historic districts from the traffic improvements.

Socioeconomic Environment

Impacts on visitor services and park operations would be identical to those of Alternative 1 except for the benefit in relief of congestion that would be realized from the traffic improvements. Impact on utilities would be identical to Alternative 1.

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PURPOSE

AND

NEED



**DEVELOPMENT CONCEPT PLAN
FOR
NORTH RIM VISITOR FACILITIES**

***DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
TO THE
FINAL MASTER PLAN AND ENVIRONMENTAL STATEMENT
GRAND CANYON NATIONAL PARK, ARIZONA***

**U.S. Department of the Interior
National Park Service
Grand Canyon National Park**

**Cooperating Agency
U.S. Department of Agriculture, Forest Service
Kaibab National Forest**

I. PURPOSE AND NEED

INTRODUCTION

The purpose of this environmental statement and development concept plan (DCP) is to supplement the 1976 Master Plan and Environmental Statement, for Grand Canyon National Park, as it relates to visitor services that will be provided at the North Rim area of the park. This supplement will analyze alternative visitor use scenarios and related impacts in order to provide a more concise prescription for visitor facilities and related use limits than that provided in the 1976 Master Plan.

The North Rim of Grand Canyon National Park provides a unique park experience in a highly scenic natural environment isolated from major population centers. On Bright Angel Point, the National Park Service (NPS) traditionally has provided access for the average summer visitor to experience spectacular views of the Grand Canyon, backcountry trails, rustic lodging facilities, and campgrounds in a ponderosa pine forest setting. Bright Angel Point contains all of the accommodation, food, information and other support services for the area with the concentration of most of these facilities in the immediate vicinity of Grand Canyon Lodge. Therefore, it is where the vast majority of North Rim visitor use occurs. Although less than 10% of the park's annual visitation of four million people is recorded at the North Rim, the area's natural features attract an increasing number of visitors each year.

The physical separation of the North Rim visitor facilities from those on the South Rim, by the Grand Canyon, creates two distinct visitor destinations in this park that should not be considered a substitute for one another. Most likely, many visitors to the North Rim will combine their trip with visits to parks in southwestern Utah (i.e., Bryce Canyon and Zion), possibly visiting the South Rim later in the same trip or on a separate trip. Also, the South Rim is accessible by public transportation, both air and rail, while the North Rim is accessible only by private autos or tour buses and most likely will remain so for the foreseeable future.

ISSUES

Visitation to the North Rim has been steadily increasing. From 172,000 visitors in 1965, visitation has doubled to a current estimated 400,000 visitors. This increase has taken place during a period when overnight accommodations, both lodging and camping, have remained static with the capacity of approximately 900 persons per night (600 lodging and 300 camping). In 1965, the daily average was 700 overnight versus 550 day use visitors over a 140 day season. In 1988, the estimated daily average was 700 overnight versus 1,633 day use visitors over a 150 day season. Consequently, the North Rim, which could be assumed to be a destination for visitors because of the four to five hour drive from major highways, is becoming more a day use area.

The increasing emphasis on day use cannot necessarily be ascribed to choice by the visitors. For example, during the 1990 season, turnaways averaged about 52 rooms per day through the end of August. Since there are normally few or no turnaways during the beginning and ending weeks of the season, turnaways during the peak June through Labor Day period are considerably higher than the seasonal average. For the campground, turnaways in the 1988 season ranged from 80 to 100 sites per day. More current use figures for the campground are estimated to be about the same. Users of lodging and camping units tend to extend their stay rather than being "one-nighters". Average time spent by lodge guests is 2.2 days and by campers, 2.9 days. Day users stay an average of 3.5 hours, a probable maximum time available considering the approximate four hour round trip to the nearest center of significant alternative lodging, Kanab, Utah.

While the number of available campsites has remained static over the years, the number of lodging units has slowly declined from about 307 units available upon completion of the original development in the late 1920's, to 220 units in 1965, and to the current level of 201. The decline has been caused by removing some units for health and safety purposes, use of some as concession employee housing and rental of some of the former duplex units as singles. There has also been some structural fire loss. Except for approximately 40 motel-type units (20% of the

available accommodations), the lodging consists of rustic cabins. These are not necessarily best suited for all types of users, particularly the elderly and handicapped. Also, they do not provide the most efficient operation during colder weather at the beginning and end of the season. However, the rustic cabins, along with most of the existing structures in the Grand Canyon Lodge and North Rim Inn areas, have been designated as historic structures and included on the National Register of Historic Places. Therefore, their preservation and continued use to the greatest degree practical, is a primary goal.

Consideration for provision of additional lodging cannot be based solely on past numbers, development patterns and type of accommodations alone. The existing lodging at the North Rim was established in the late 1920's and designed to meet the needs, preferences and standards of that era. Any new lodging development must take into account current needs and preferences, modern health, safety and access standards, and the capacity of the North Rim to absorb such new development in concert with preserving the natural scene.

There is a potential to realize at least partial relief from the current shortage of lodging and camping units from the proposed Forest Service development on the North Kaibab Ranger District of the Kaibab National Forest adjoining the north boundary of the park. Currently, two areas on the forest, Jacob Lake and Kaibab Lodge (located 43 and 18 miles respectively north of the rim and 30 and 5 miles respectively from the park boundary), provide 57 lodging units and 205 tent or full service camping units on national forest, leaseholder or private lands. The 1988 Kaibab National Forest Plan prescribed expansion of these facilities by approximately 93 lodging units and 100 camping units over the next four to ten years. This prescription is on a geographic basis and not site specific. However, emphasis on this expansion is expected to occur in the Kaibab Lodge area.

Even with the Forest Service expansion, current demand may not be met and users of these facilities may be seeking the national forest recreation experience instead of or as well as visiting the park. The Forest Service reports that Kaibab Lodge now experiences a 95% occupancy rate with approximately 50 turnaways on full days. Jacob Lake experiences a 92% occupancy rate with 50 to 100 turnaways per day when filled. DeMotte campground near

Kaibab Lodge is full 90% of the time and the campgrounds at Jacob Lake are full 95% of the time. The Forest Service also allows camping on unimproved sites in the area and a considerable amount of this type of use also is reported.

Another major issue at the North Rim is the increasing congestion in the Grand Canyon Lodge Area of Bright Angel Point. This is caused by the fact that all of the registration, information and food services are located at the Lodge. Food services, consisting of a formal dining room and snack bar, must serve both visitors and employees. Consequently, long waits are common during peak use periods. Also, current road and parking lot layout tend to aggravate traffic circulation. These factors combined with the increasing number of day users have created an unsatisfactory management situation and an impaired visitor experience.

A contrasting issue to those stated above dealing with identified deficiencies in visitor services is that many of the past and current users of the North Rim express a strong preference for the rustic and slow paced atmosphere of the area. For this reason, there are reactions ranging from reluctance to strong opposition to accepting any proposed additions to or changes in the area. These reactions are most acute regarding increases in lodging, camping or any other proposals that appear to have the potential to attract more visitors.

An issue that is not part of this analysis is that of winter use. Even though new accommodations proposed under the action alternatives would be winterized in their construction, this would be for the sake of efficiency of operation in the spring and fall rather than allowing for future winter use. The existing water and sewer systems are not designed for winter use and there are no plans to upgrade for this use.

PLANNING HISTORY

As early as 1975, there were planning efforts in progress for additional visitor facilities for the North Rim. However, the Grand Canyon Master Plan and associated environmental statement were also underway and the final plan was approved in 1976. Therefore, the Master Plan provided the first official direction to future planning for the North Rim. Key elements stated were:

- The maintenance of a relaxed pace would be essential to a continuing awareness of the natural surroundings. Facility developments would not only be subservient to the natural surroundings, they also would constantly involve the visitor with the environment. To help maintain this goal, recreation use capacities would be placed on visitation.
- Bright Angel (North Rim) Campground would be expanded by not more than 100 units.
- Development would only be to improve the efficiency of existing facilities. Any expansion of the number of lodging units will be done through a more efficient utilization of land already affected by developments, with no significant loss of natural or traditional values.
- All lands outside the 200 foot right-of-way along the paved roads would be managed as primitive backcountry.

In 1982, active planning for a specific "comprehensive design" resumed for the North Rim. The term "comprehensive design" was used at that time instead of development concept plan (DCP) as was used for the later 1988 and current planning efforts. A comprehensive design plan and environmental assessment were prepared and an availability for review notice published in the March 18, 1982, *Federal Register*. The 1982 plan proposed the construction of a lodge structure at upper Transept Canyon, expansion of the North Rim Inn Campground and traffic and employee housing improvements. The comment period remained open until May 3, 1982. At the close of the comment period, normal procedure would have been to execute a Finding of No Significant Impact (FONSI) and implement the project if no major unresolved issues

remained. In this case, while there was no record of any unresolved issues, a FONSI was neither prepared nor executed.

Although no FONSI was issued for the 1982 plan, National Register nominations and consultation with the Arizona State Historic Preservation Officer (SHPO) and the Advisory Council On Historic Preservation (ACHP) proceeded on the Grand Canyon Lodge Area and North Rim Inn. This resulted in a January, 1983, Memorandum of Agreement (Appendix B) on the 1982 plan as it affected the Grand Canyon Lodge Area, North Rim Inn and Campground, and the North Rim Headquarters area. The National Register nominations were processed and the named areas included as historic districts. Work on the budget cabins and the Grand Canyon Lodge proceeded because of life and safety considerations. These actions could be taken independent of approval of the overall 1982 Comprehensive Design Plan.

In November, 1984, NPS entered into a new 20 year concessions contract with TW Recreational Services, Incorporated. As part of the overall contract requirements, the concessioner would be responsible for construction of the concession facilities identified in the 1982 Comprehensive Design Plan. Basically, this included the new lodge, restaurant and concession employee housing. The contract was executed subject to completion of environmental compliance on the proposed development that was identified in the contract.

In 1987, a park operations evaluation surfaced the fact that the 1982 plan had not received final approval through the execution of a FONSI. Faced with this circumstance and a desire to reconsider the siting of the proposed overnight lodging, the NPS reopened planning efforts for the North Rim. The proposal of placing the lodging in the vicinity of the North Rim Inn, versus upper Transept Canyon, was introduced at this time on the basis that construction near the North Rim Inn would be within an existing area of development and impact, and in proximity to existing utilities.

The revised plan was released for public review as the *Development Concept Plan and Environmental Assessment, Grand Canyon, North Rim*, in February, 1988, for a 30 day review period. Availability also was announced in the *Federal Register*. The document was circulated to 125 individuals, organizations and agencies with 53 of these

responding with comments. Twenty-eight commentators supported the proposal and 25 disapproved. Further negotiations were conducted with the Arizona SHPO regarding compliance with the 1983 Memorandum of Agreement, particularly regarding disposition of existing cabins in the area of the proposed lodging development. By September, 1988, satisfied that agreement could be reached with the Arizona SHPO, a draft FONSI was prepared and a 30-day review period for this draft was announced in the *Federal Register*. One response was received, from the Sierra Club Legal Defense Fund (SCLDF), Rocky Mountain Office, that raised several questions on the proposed plan, many of which were identical to those raised by opponents of the plan during the prior public review of the plan. The draft FONSI incorporated responses to the most common issues raised. Separate responses to those that were not, but raised by the SCLDF, were provided to that organization. The FONSI and plan subsequently were approved on November 2, 1988.

In February, 1989, the SCLDF filed a Freedom of Information Request for material relating to past planning efforts at the North Rim. In June, 1989, the SCLDF filed suit in the U.S. District Court in Phoenix, Arizona, to enjoin the NPS from constructing the new lodge. On July 7, 1989, the Court issued a preliminary injunction that prohibited construction of the hotel and restaurant, associated parking lot and other construction or removal of cabins or trees. The court order did not apply to employee housing construction or other aspects of the 1988 DCP. Following this action, NPS decided to re-evaluate the environmental consequences of the project through the preparation and circulation of an environmental impact statement. The Notice of Intent was published in the *Federal Register* of September 1, 1989.

Besides NPS planning for the North Rim, the Kaibab National Forest has been actively planning for visitor facilities on the national forest lands located to the north. This is further discussed under *Issues* preceding. The Draft Forest Plan and Environmental Statement was released in 1986 and Final Plan and Environmental Statement in 1987. In 1989, a Plan Amendment assigned potential lodging expansion in the North Kaibab area on a geographic basis rather than on a site specific basis as had been done in the Plan. Campground expansion had not been assigned on a site specific basis in the Plan.

SUMMARY

Based on the previously described issues and the planning history of this project, this environmental impact statement identifies and analyzes the impacts of alternatives ranging from preserving the status quo to providing solutions to all or part of the prior-stated issues related to visitor service deficiencies. The development of these alternatives and identification of impacts takes into account both past National Park Service planning actions for the area and those of the Forest Service for the adjoining Kaibab National Forest.

ALTERNATIVES



II. ALTERNATIVES

INTRODUCTION

All of the alternatives considered take into account the Kaibab National Forest Plan's prescription for additional overnight lodging and camping development for the North Kaibab District of the Kaibab National Forest. The focal points of this development will be in the vicinity of existing visitor services areas at Jacob Lake, located 43 miles north and in the Kaibab Lodge area, located 18 miles north of the existing visitor facilities in the park (see North Rim vicinity on Map 2). The Forest Plan assigns proposed additional units of lodging and camping on a geographic rather than a site specific basis. However, the greatest increase in both camping and lodging facilities and the earliest implementation of these increases are most likely to occur at or near the Kaibab Lodge site which now has 22 lodging units operated by a leaseholder and 22 campsites operated by the Forest Service. An additional 53 lodging units within five years and an additional 53 to 58 campsites over the next four to seven years are projected for this area. At Jacob Lake, there are 35 lodging units operated by a leaseholder, and an RV park, containing 80 full service and 50 tent camp sites, located on private lands. In addition, there is a 53 unit Forest Service campground. Only lodging facilities are projected to be expanded at Jacob Lake with a potential increase of about 40 units eight to ten years in the future. A visitor center also is planned for construction at Jacob Lake.

There are two other factors common to all alternatives. The first is that eventual adoption of any single option or combination of more than one, would constitute a modification and/or clarification of the limited definition of prescriptions stated for the North Rim in the 1976 Grand Canyon National Park Master Plan. The second is that adoption of any of the alternatives will require a new Memorandum of Agreement, between the NPS and the State Historic Preservation Officer and Advisory Council on Historic Preservation, on the proposed North Rim development. All of the alternatives pose a significant enough difference from the 1982 Comprehensive Design Plan, on which the 1983 Memorandum of Agreement was

based (see Appendix B), that a new rather than amended agreement would be prudent.

An alternative that specifically addresses locating all future lodging and camping needs for visitors to the North Rim on the adjoining Kaibab National Forest is not included. As stated previously, all of the alternatives take into account the Forest Service visitor development proposals for this area. In addition, both Alternatives 1 and 5 described in the following pages, do not provide for additional camping and lodging within the park. The environmental consequences of the selection of either of these alternatives, both on the park and national forest, is then evaluated. Therefore, the development and analysis of a separate national forest accommodations alternative would be redundant.

PLATE 1 -- COMPARISON OF MAJOR FEATURES OF ALTERNATIVES

ALTERNATIVE	LODGING	FOOD FACILITIES	CAMPING UNITS	TRAFFIC IMPROVEMENTS
1 (NO ACTION)	No new lodging.	Retain existing facilities.	No addition. Retain existing 83 units.	Routine maintenance and safety improvements only.
2 (NORTH RIM INN LODGE)	Construct 100 unit lodge in North Rim Inn area. (See Note)	Construct 100 seat restaurant with separate employee dining facility adjacent to lodge.	Expand existing campground by 17 units. Add new 33 unit campground. Total 133 units.	Redesign parking lots and circulation at Grand Canyon Lodge. Redesign traffic flow in North Rim Inn area.
3 (NORTH RIM INN CABINS)	Construct 20 fourplex cabins (80 lodging units) in North Rim Inn area. (See Note)	Construct restaurant, as under Alternative 2, adjacent to cabins.	Same as Alternative 2.	Same as Alternative 2.
4 (CAMPGROUND EXPANSION ONLY)	No new lodging.	Potentially add snack food service within North Rim Inn structure.	Expand existing campground by 12 units. Add 33 unit campground, as in Alternative 2, plus additional 35 unit campground. Total 163 units.	Same as Alternative 2.
5 (TRAFFIC IMPROV. ONLY)	No new lodging.	Same as Alternative 4.	No additional camping units.	Same as Alternative 2.

Note: The 100 unit lodge and alternate 20 fourplex cabin units are considered the optimum for the site. However, since these two options result in a difference of 20 units, there is a need to compare like numbers between the two options. Therefore, 80 unit lodge and 25 unit cabin plans also are analyzed under Alternatives 2 and 3.

ALTERNATIVE 1 - NO ACTION

No basic changes to the North Rim developed area would be undertaken (see Maps 4 and 5). Repairs and rehabilitation of existing buildings and facilities would be completed only when justified for safety of visitors and/or park staff, to preserve historic structures and to maintain service and facility quality. The current level of 201 guest accommodation units would be maintained although there may be a modest increase as employees occupying some of the units are moved to new housing now under construction. However, in view of the fact that considerable doubling up of employees now exists, any gains in accommodations from this source may not be significant. Additional demand for increased overnight lodging and camping would be partially or wholly met through expansion of such facilities on the adjoining national forest or elsewhere outside the park. The existing restaurant, cafeteria, visitor information and registration services at the Grand Canyon Lodge, and the camper store, laundry and service station in the North Rim Inn area, would continue to serve as visitor support functions.

North Rim Inn Area

The 83 unit campground and four unit group camp, amphitheater, camper store, laundry and service station would be maintained. In accordance with the 1983 Memorandum of Agreement with the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation, the North Rim Inn would have its exterior restored and interior rehabilitated. Four cabins located immediately adjacent to the Inn and associated with the design, historic fabric and concession operation of the Inn, will be retained and continue to be used for concessioner housing. Ten existing log cabins, located northwest of the Inn and now used for park staff housing, will be retained for this purpose, at least over the foreseeable future, and as long as repairs and maintenance remain feasible and prudent. Thirty frame cabins, located north of the Inn, historically used as visitor accommodations and now used as concessioner housing, are in substandard and deteriorated condition. The cabins have been vacated with the move to the new concessioner housing constructed in lower Transept Canyon. These cabins would be retained on site pending conduct of a survey, in consultation with the Arizona State Historic Preservation officer and the Advisory Council, to determine whether or not any or all of the cabins could be economically restored as either visitor

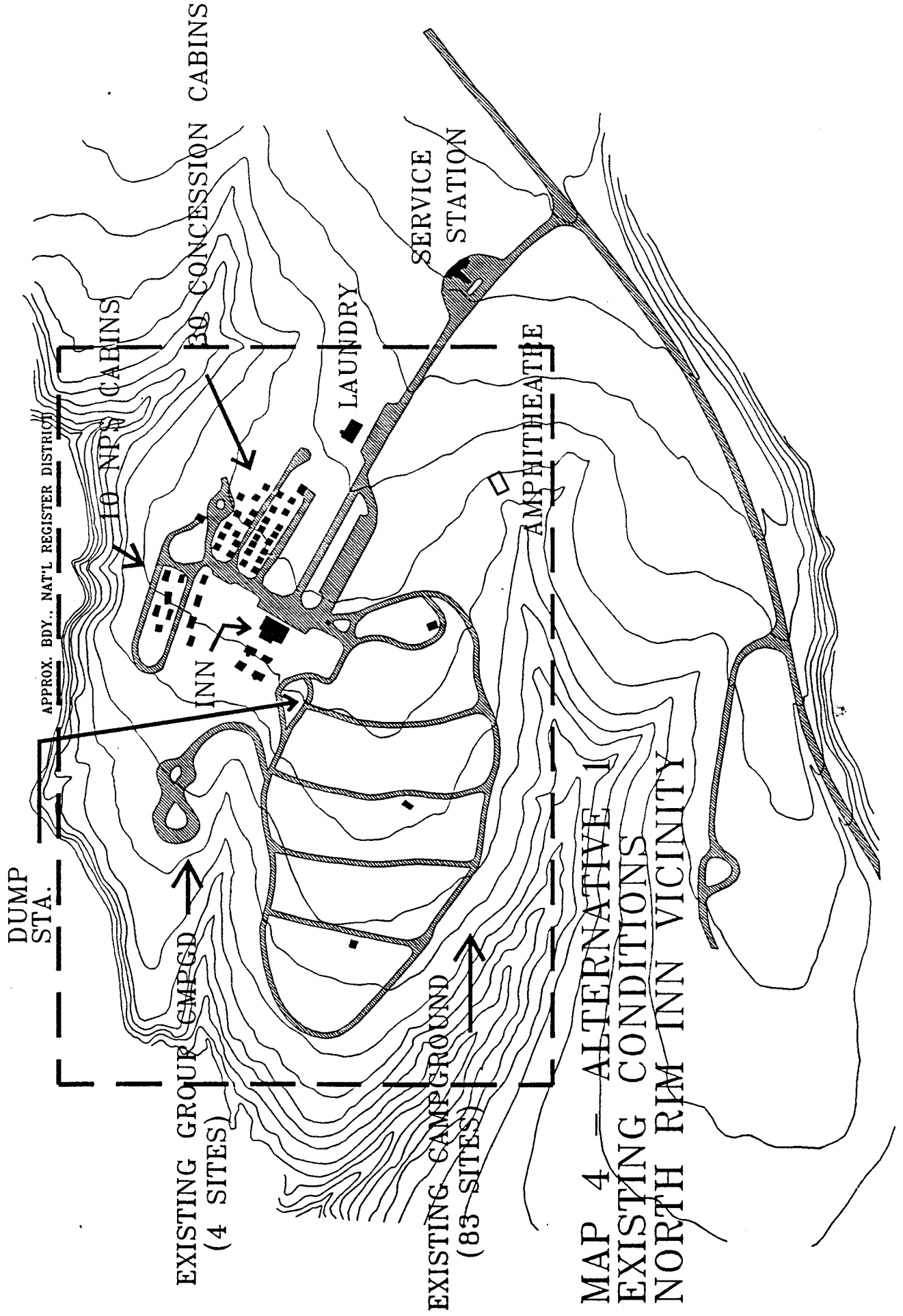
accommodations, employee housing or for utility use, or parts reused in existing housing or accommodations. For any cabins that could be restored, a decision would have to be made either to retain on site or move to another location.

**Grand
Canyon
Lodge Area**

The existing 201 accommodation units would be retained with a possible modest increase in units stemming from concessioner employees moving out of former visitor units to the new concessioner housing. Functions associated with the Grand Canyon Lodge, including restaurant, cafeteria, lounge, curio shop, restrooms and visitor information and registration facilities would continue. No changes would be made in the existing parking and road facilities. Being in close proximity to the premier scenic attractions of the area and having the only food services and visitor information and registration facilities, the Grand Canyon Lodge area will continue to be a focal point for the static number of overnight visitors and a potentially increasing number of day users. Thus the existing congestion problems would remain and most likely, would get worse. Consideration could be given to moving some of the visitor information services, particularly those dealing with accommodation availability, to the Forest Service's new visitor center, when completed, at Jacob Lake. This may serve to provide some minor relief to congestion within the Lodge. Providing staff to Jacob Lake would be questionable because of the distance involved.

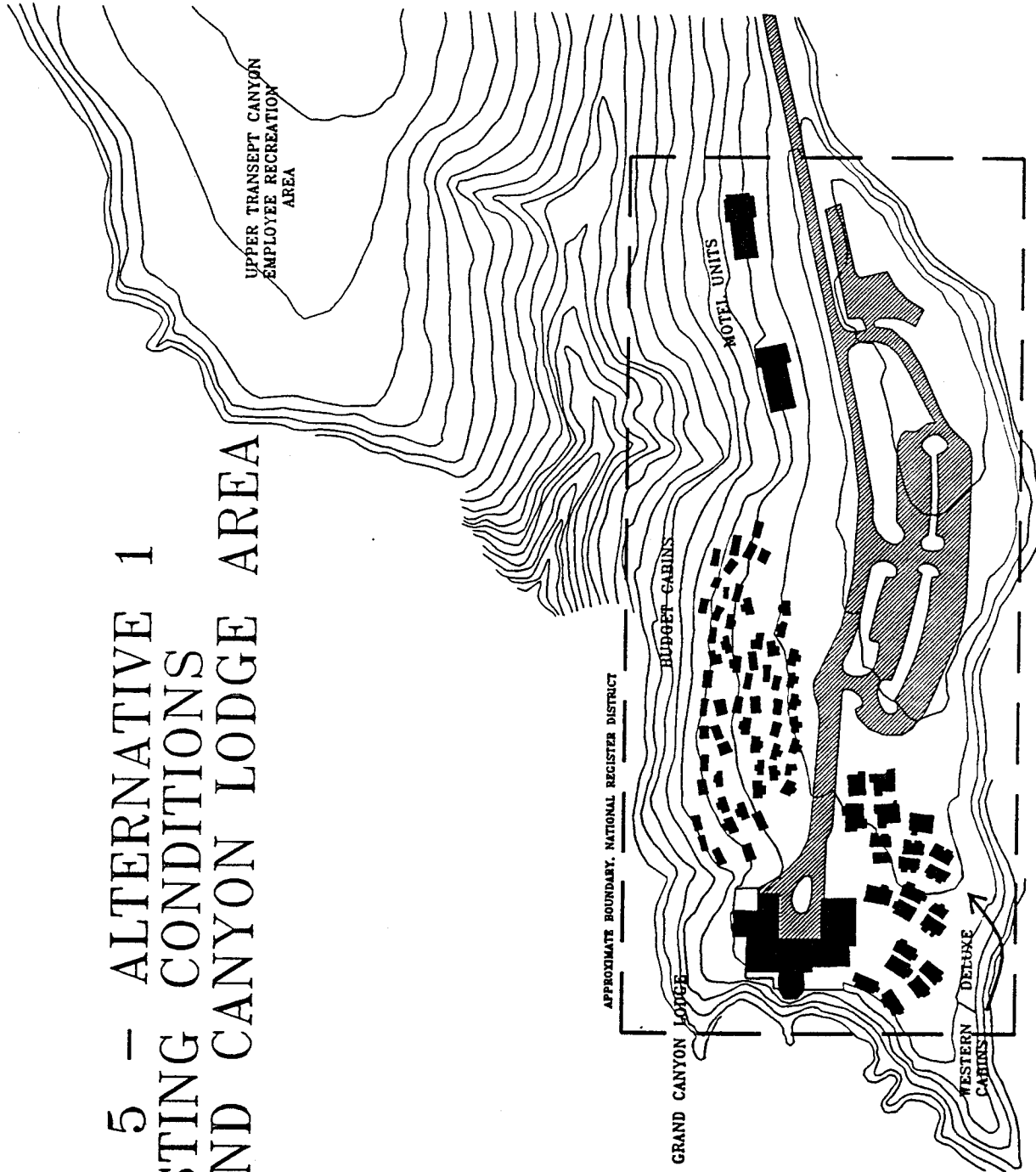
**Master Plan
Consistency**

Not adding to the existing number of lodging and camping units would contribute to limitation of some use at the North Rim and thus contribute to maintenance of a relaxed pace as called for in the Master Plan. However, failure to address the traffic congestion problems at Grand Canyon Lodge detracts from visitor enjoyment of a leisurely experience. Also, the Master Plan does allow for campground expansion and some development to improve the efficiency of existing facilities (i.e. traffic improvements, some lodging within existing development, etc.). Therefore, adoption of the no action alternative would constitute an amendment to the Master Plan.



MAP 4 - ALTERNATIVE 1
EXISTING CONDITIONS
NORTH RIM INN VICINITY

MAP 5 - ALTERNATIVE 1
EXISTING CONDITIONS
GRAND CANYON LODGE AREA

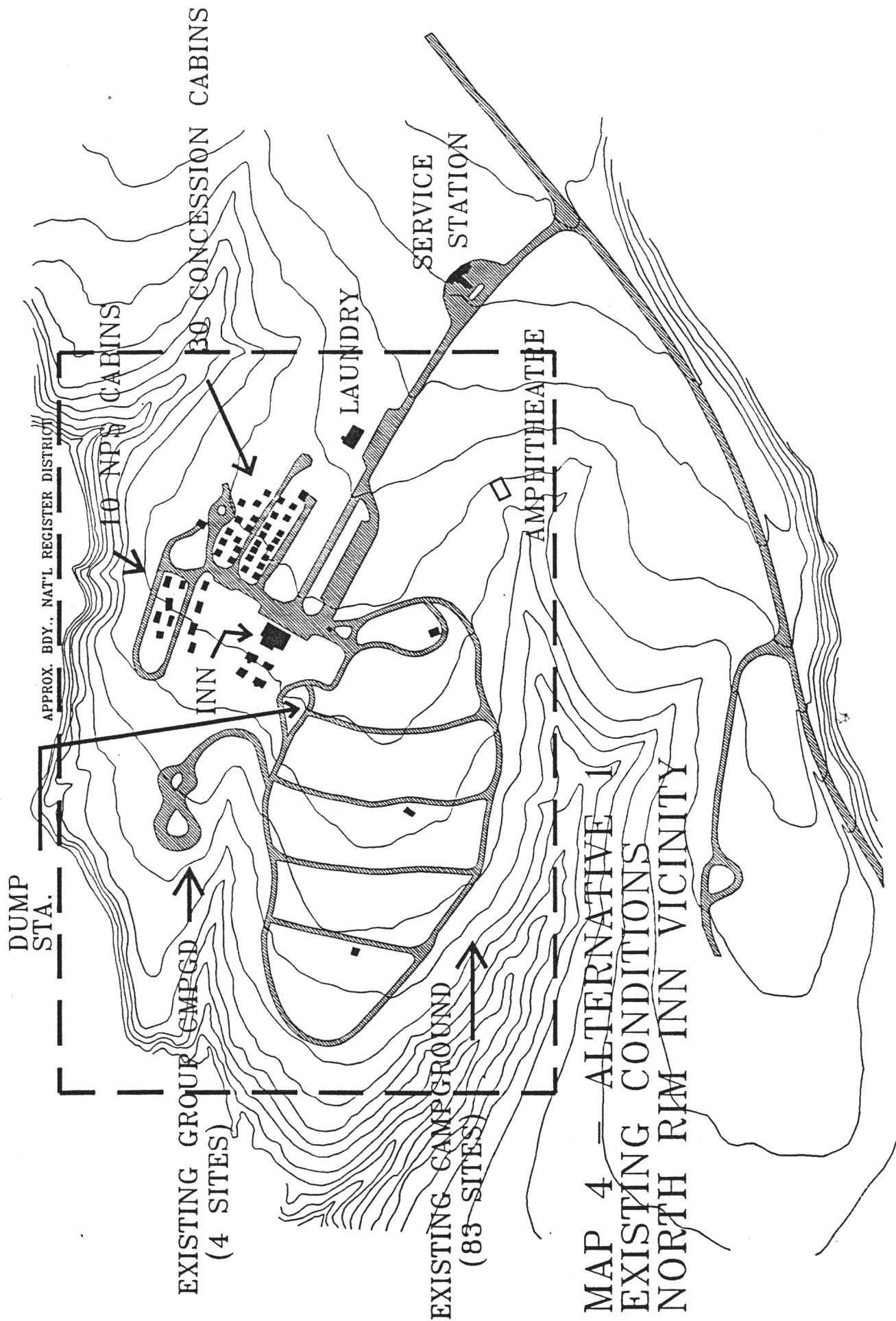


ALTERNATIVE 2 - THE PROPOSAL, NORTH RIM INN LODGE

This alternative constitutes the proposed action and would provide additional overnight lodging and camping, food services, and traffic improvements to the North Rim developed area. In the North Rim Inn area, a 100 unit motel with adjoining restaurant would be constructed which would raise the total overnight accommodation unit level to 301, 100 above the current level. To compare with Alternative 3 following, an 80 unit version of the proposed lodge is examined under *IV. ENVIRONMENTAL CONSEQUENCES*. The campground would be expanded by 50 units and segregated into 70 tent and 63 RV sites for a total of 133 units. Traffic flow and parking improvements would be made at the Grand Canyon Lodge complex to reduce congestion and enhance the visual and historic values of the lodge environs. There would also be an information station with restrooms at the lodge parking area.

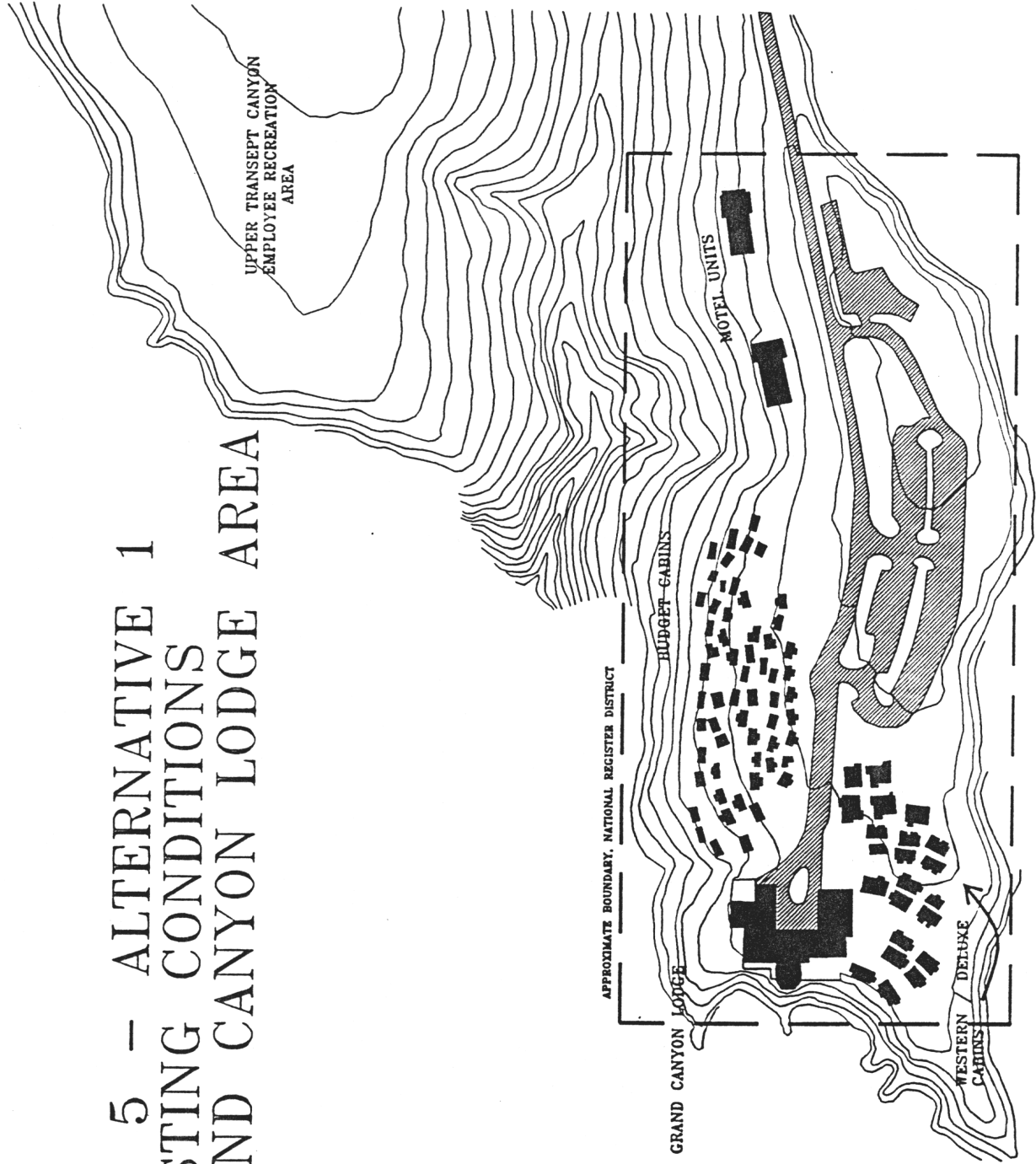
The proposal to provide additional lodging and campsites, in view of the Forest Service's expansion proposals, is based on the assumptions that: (1) the overnight or longer stay is an established and important part of the North Rim experience; (2) increased demand in recent years is more than sufficient to fill both the NPS and Forest Service proposed facilities and turnaways still are anticipated; (3) two potential user groups are being served in that users of the North Rim overnight accommodations are primarily seeking the Grand Canyon experience while at least some, if not all, of users of the Forest Service facilities may be seeking the varied national forest recreation opportunities, either combined with or exclusive of the park experience; (4) from the management standpoint, the new units would be more utility efficient for operation in the early and late season; and (5) introduction of the modern units would insure continuity of providing a reasonable level of overnight use in view of the fact that most of the existing units are more susceptible to loss or temporary closures because of their age and rustic construction.

The 301 total lodging units and 133 campsites that would be available if this alternative is implemented would be considered the ceiling on overnight accommodations for the North Rim. Unmet existing or future demand would have to be filled outside the park, either on the national forest or in the more distant communities to the north.



MAP 4 - ALTERNATIVE 1
EXISTING CONDITIONS
NORTH RIM INN VICINITY

MAP 5 - ALTERNATIVE 1 EXISTING CONDITIONS GRAND CANYON LODGE AREA



**North Rim
Inn Area**

The proposed new lodging and restaurant complex will be constructed on the site of and immediately west and north of the 30 frame cabins formerly used as visitor accommodations. The lodge will consist of a pair of two story structures containing 60 and 40 lodging units respectively (see Map 6 and Plates 2 & 3). An 80 unit version would utilize two 40 unit structures on the same site. The restaurant will be a single story structure featuring limited table service that will accommodate about 100 customers and provide a separate dining area for employees (see Map 6 and Plate 4). Registration for all overnight lodging at the North Rim will be handled in this new complex. The three buildings will be situated over 100 feet from the edge of the head of Transept Canyon, a side canyon of the Grand Canyon extending in a northwesterly direction. The structures will not be visible from within the Grand Canyon proper. An architectural design has been selected that is compatible with the existing North Rim Inn structure and that conforms to existing contours to minimize disturbance. Passive solar amenities will also be considered where feasible. Existing trees will be retained to the greatest degree possible for screening and native vegetation will be planted to fill the voids left by construction. The lodging units will be winterized for more efficient operation at the beginning and end of the visitor season, low flow plumbing fixtures will be utilized and design considerations will be incorporated to accommodate the handicapped in some units.

Parking for the lodge and restaurant will require the removal of the 30 frame cabins. Eight of these will be relocated to the concession housing area in lower Transept Canyon. The 10 log cabins used for park staff housing are not in the direct path of the proposed development. However, they ultimately will be vacated and the employees placed in new housing located within the existing NPS housing area which will be redesigned to accommodate this as funds become available. These cabins also will be removed with consideration for relocation of any that are adaptable for that purpose. Otherwise, reuse of the architectural elements or parts of the frame and log cabins in the maintenance and preservation of other historic structures in the North Rim developed area will be considered. This will be accomplished in accordance with a new memorandum of agreement, similar to the 1983 Memorandum of Agreement (see Appendix B), and in further consultation with the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation. The entrance

REMOVE 10 EMPLOYEE
CABINS AND RESTORE LANDSCAPE

REMOVE 30 FRAMPTON
CONCESSION
HOUSING
CABINS

REDESIGN GROUP
CAMPGROUND

DEVELOP 100 UNIT
LODGE, RESTAURANT
and PARKING

47
TENT SITES

RESTAURANT

LODGE 80 UNITS

LODGE 40 UNITS

INN

LOBBY

53
RV
SITES

CMCD
REG.

KIOSK

SERVICE
STATION

EXPAND CAMPGROUND
BY 33 SITES

AMPHITHEATRE

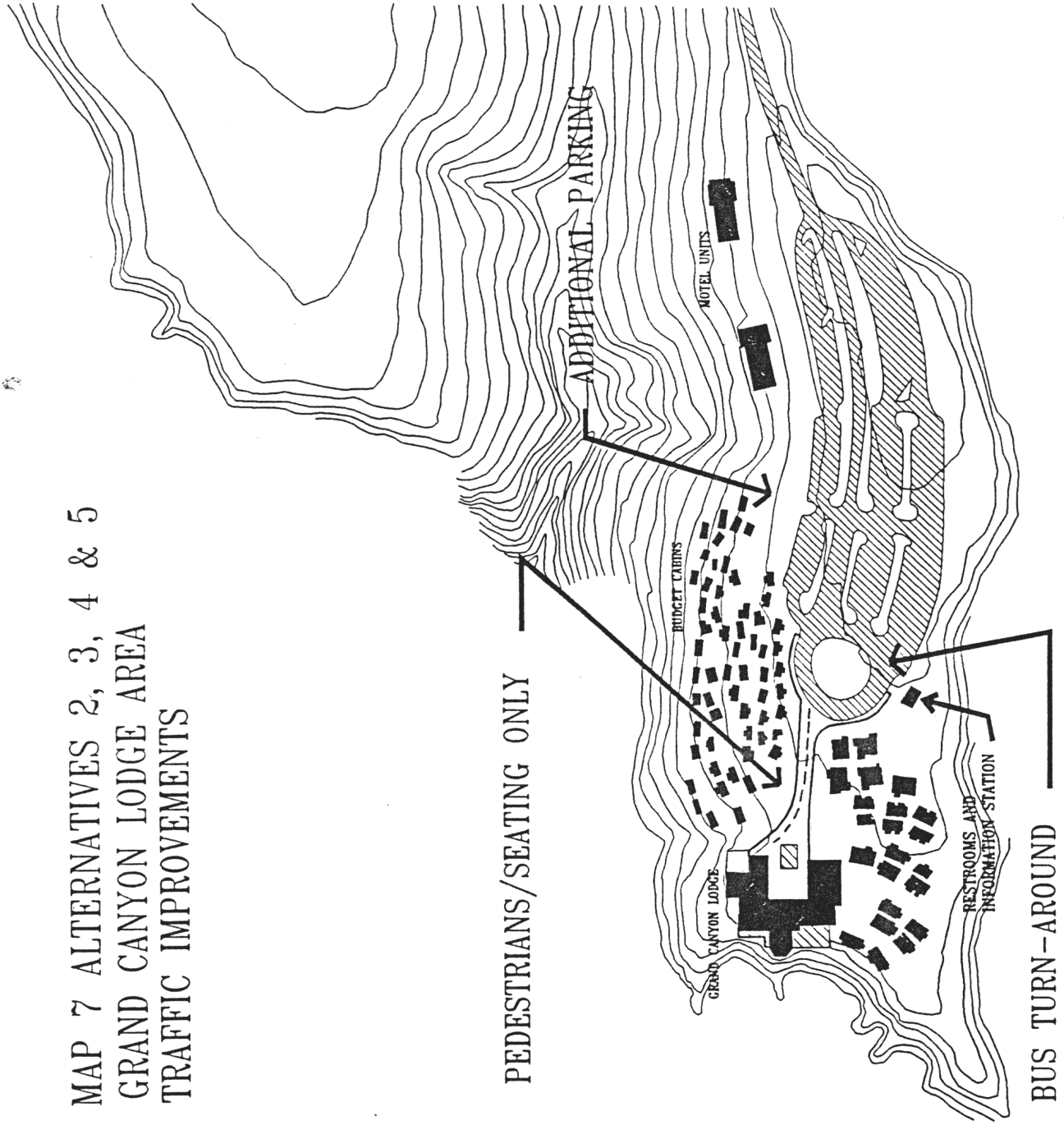
23
TENT
SITES

10
RV
SITES

DUMP
STATION

MAP 6 PROPOSAL-
ALTERNATIVE 2
NORTH RIM INN VICINITY

MAP 7 ALTERNATIVES 2, 3, 4 & 5
GRAND CANYON LODGE AREA
TRAFFIC IMPROVEMENTS



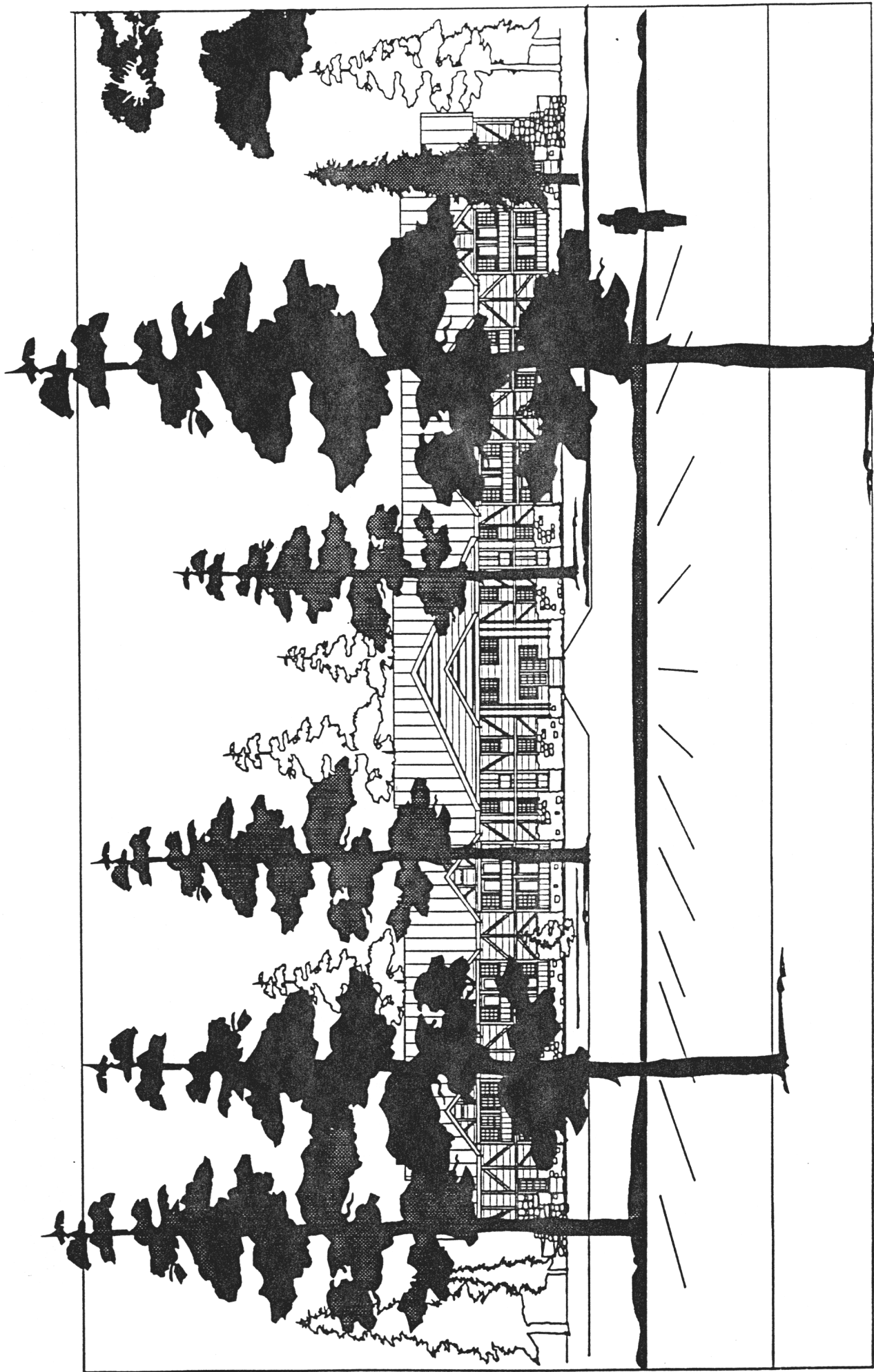


Plate 2 - Proposed Lodge "A" (60 units)

Note: Not all residual vegetation depicted in order to show building detail.

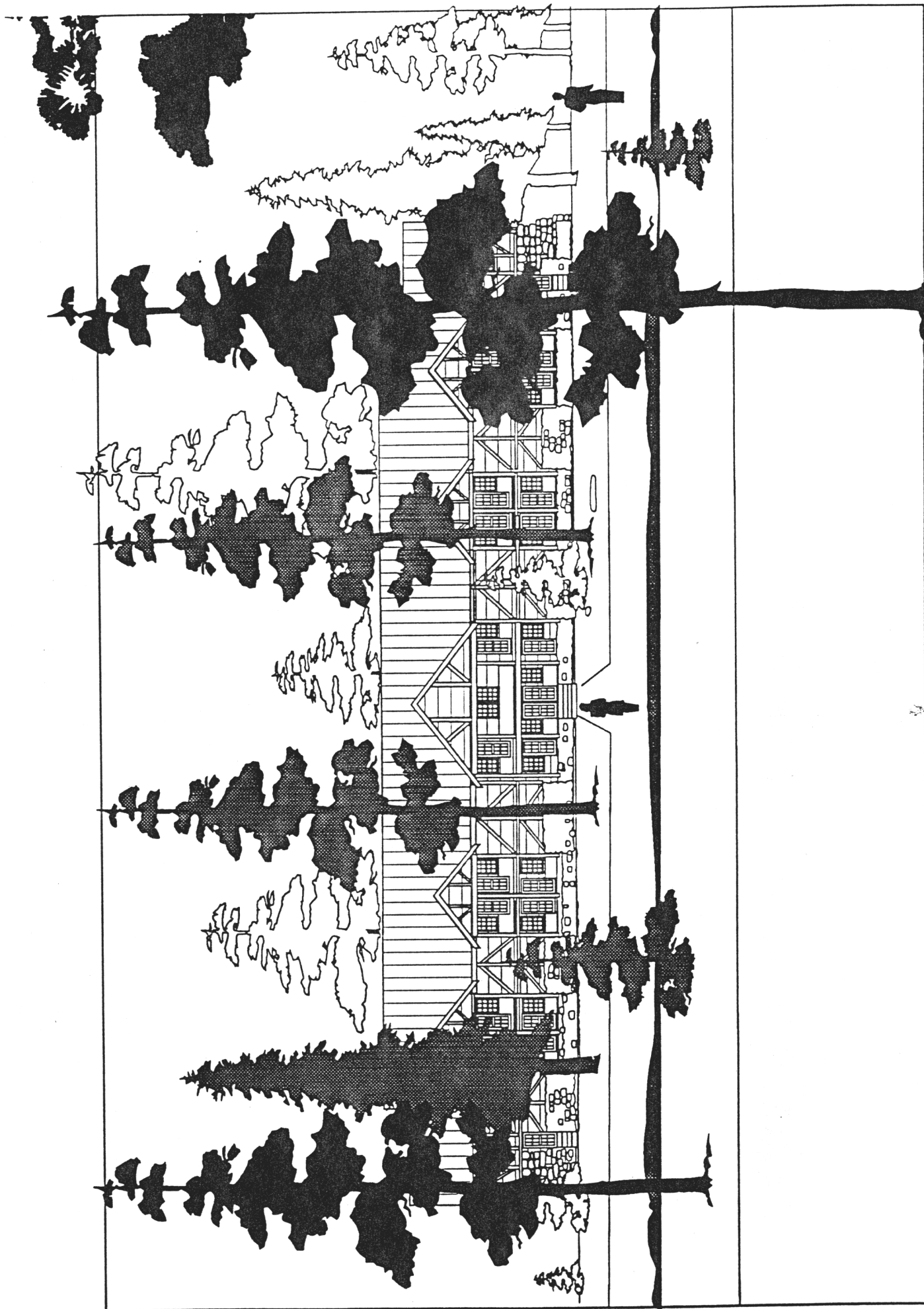


Plate 3 - Proposed Lodge "B" (40 units)

Note: Not all residual vegetation depicted in order to show building detail.

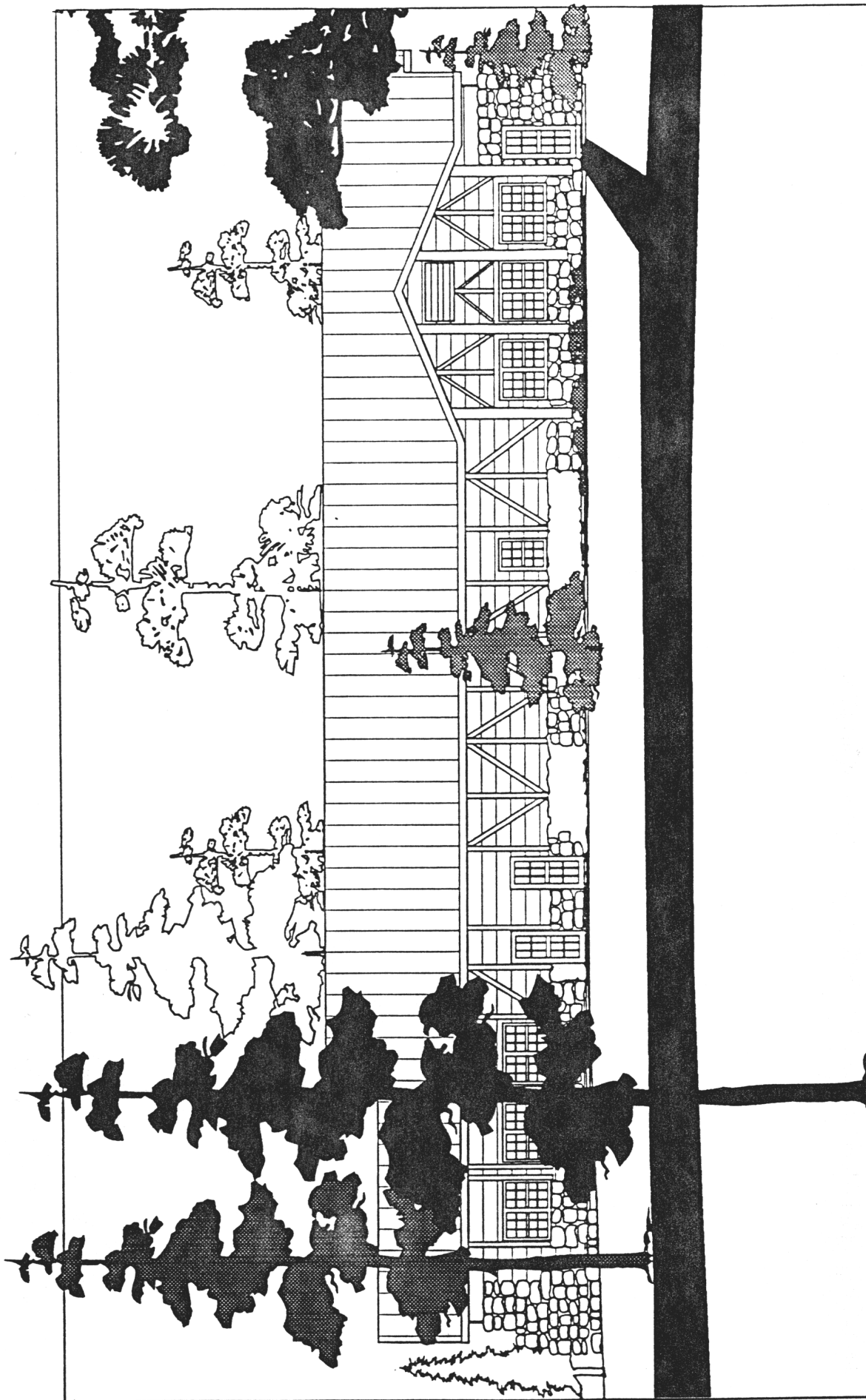


Plate 4 - Proposed Restaurant

Note: Not all residual vegetation depicted in order to show building detail

ALTERNATIVE 3 - NORTH RIM INN CABINS

This alternative would substitute 20 fourplex cabins for the lodge structure proposed under Alternative 2 (see Map 8 and Plate 5). These would be constructed in the same general vicinity as the proposed lodge structure and would add 80 additional overnight units for a total of 281 units. For comparison with the 100 unit lodge proposal under Alternative 2, a 25 cabin version (100 units) is evaluated under *IV. ENVIRONMENTAL CONSEQUENCES*. The restaurant would be of a similar size and function as that described under Alternative 2 and located adjacent to the cabins. A registration facility will also be constructed, convenient to the new parking lot, which will serve guest registering at both the Inn cabins and the Grand Canyon Lodge facilities. The campground would be expanded and restructured and the support facilities (shower/laundry, dump station, kiosk, etc.) relocated as prescribed under Alternative 2. The rationale for providing additional lodging and camping facilities within the park is the same as that stated for Alternative 2. Traffic and other visitor use improvements at the Grand Canyon Lodge area remain the same as for Alternative 2. Also, like Alternative 2, the additional lodging and camping facilities will be considered the ceiling on overnight accommodations at the North Rim.

North Rim Inn Area

The new lodging units, consisting of 20 fourplex cabins comprising 80 units and two linen storage buildings (a one fourplex cabin equivalent in space), would be constructed on the site of the existing 30 frame cabins and extend in a northeasterly direction nearly to the existing service station. Floor plans would resemble the deluxe fourplex cabins in existence in the vicinity of Grand Canyon Lodge, but would be tailored to conform with the North Rim Inn surroundings. The 25 cabin version would occupy the same area but extend further northward to avoid coming in closer proximity to the rim. The restaurant, as described for Alternative 2, would seat 100 customers and have an employee dining area. The restaurant structure would be located on the site of the existing 10 log cabins used for NPS housing and would be of a design compatible with both the North Rim Inn and the new fourplex cabins. Like the structures proposed under Alternative 2, the buildings will be situated at least 100 feet from the edge of Transept Canyon and will not be visible from within the Grand Canyon. A registration facility will also be constructed, convenient to

road to the lodge/restaurant complex will be designed to separate the campground, Inn and new lodge traffic. Existing vegetation and islands will be utilized to screen the parking area and the space left by the eventual removal of the 10 log cabins at a later date will be restored to natural conditions and serve as buffer between the lodge/restaurant complex and the group campground.

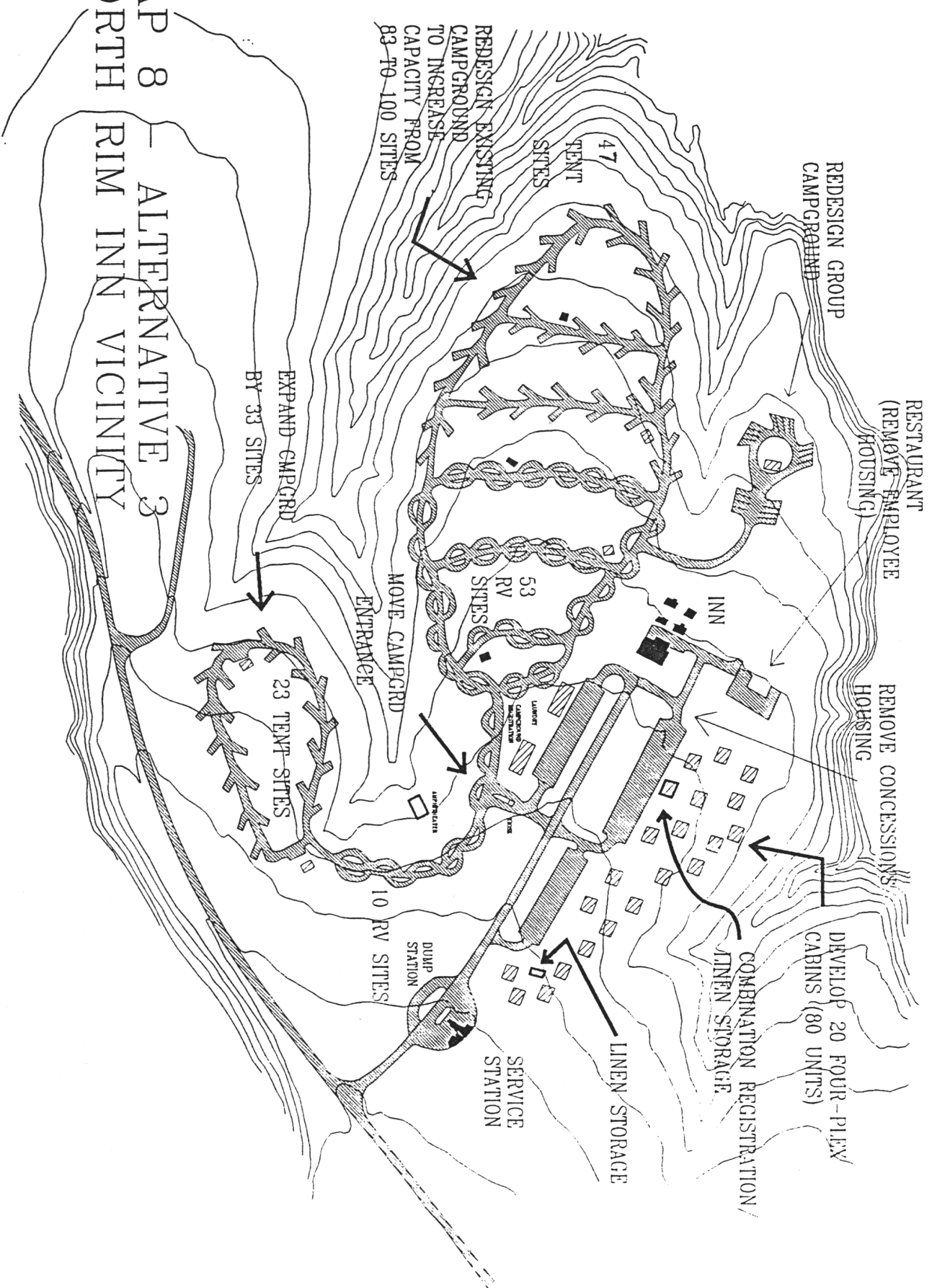
Restoration of the North Rim Inn would be accomplished as provided for under the above mentioned memorandum of agreement. The Inn will undergo external restoration and internal rehabilitation in accord with a Historic Structures Report to be accomplished by NPS in consultation with the Arizona SHPO. The Inn would continue to serve as a camper services store for both the existing and expanded campground. The four cabins associated with the Inn would be retained.

A 33 unit expansion to the existing 83 unit campground, would be built between the main park entrance road and the existing campground (see Map 6). The expansion would include two new comfort stations and a buffer strip would be retained between the new site and both the main park road and the North Rim Inn entrance road. The existing campground would be reconfigured to segregate tent and RV camping and to expand from the current 83 units to 100 units. The net result of the expansion and reconfiguration would be a 133 unit campground. The existing amphitheater would be retained and the existing group campsite area would be redesigned on the same site to reduce impact on soils and vegetation.

The existing laundry/shower building would be moved to a new location at the northwest corner of the existing campground and the dump station would be relocated across from the existing service station. The laundry/shower facility would be expanded as necessary to provide those services for the increased numbers of campers and lodgers at the North Rim Inn area. A campground registration station, that will provide both registration and visitor information services, would be constructed adjacent to the relocated shower/laundry building and a new entrance kiosk for the campground would be provided. (See Map 6 for location of the above improvements.)

All necessary utilities for the proposed new or relocated facilities are either in place or in close proximity. Water and

MAP 8 — ALTERNATIVE 3 NORTH RIM INN VICINITY



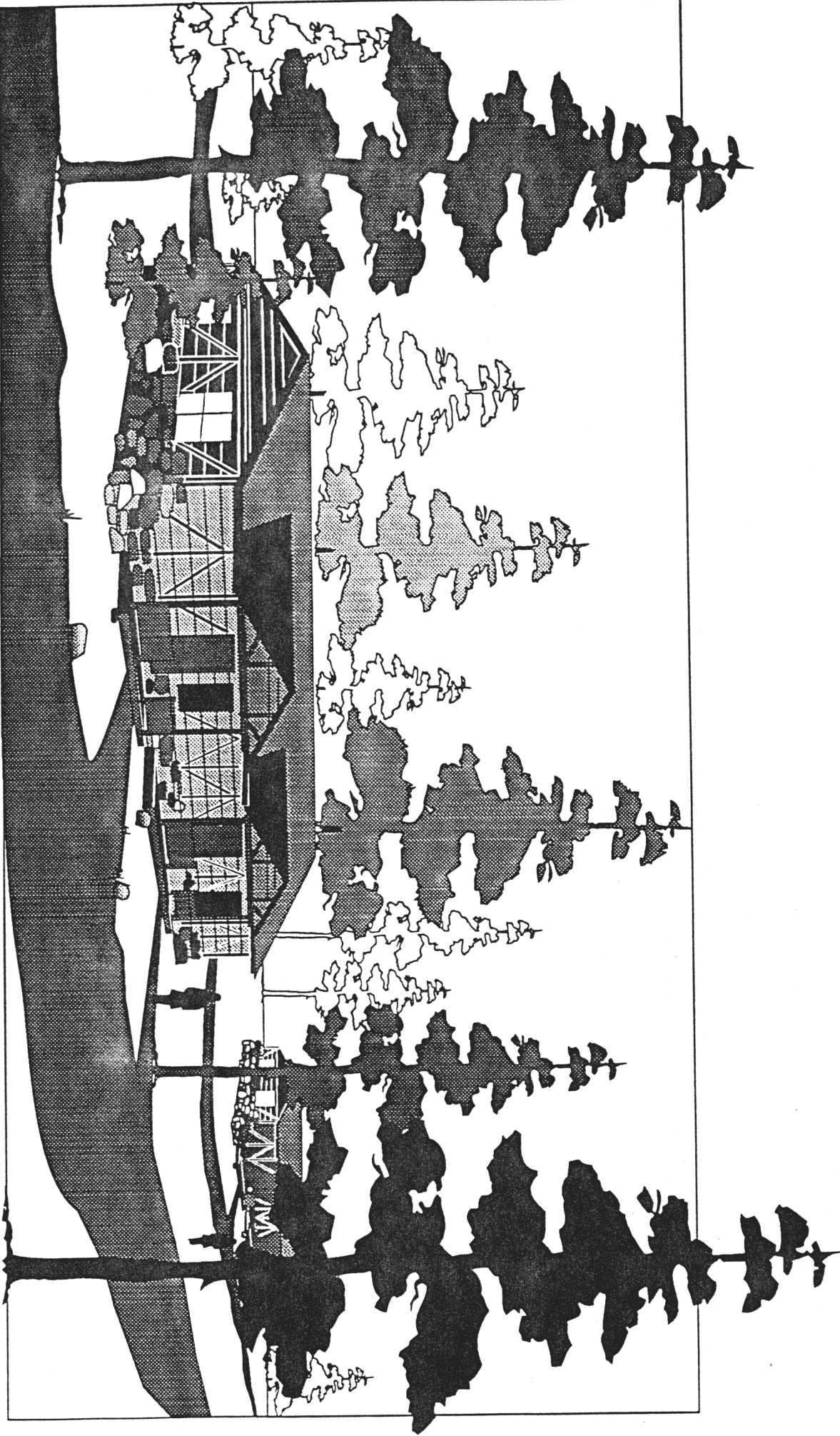


Plate 5 - Proposed Fourplex Cabins
Proposed cabins (conceptual drawing subject to refinement)

the new parking lot, which will serve guest registering at both the Inn cabins and the Grand Canyon Lodge facilities. The employee lounge function will be relocated to lower Transept Canyon employee housing area. Walkways will be provided between the cabins to minimize impact on soils and vegetation and existing trees will be retained to the greatest extent possible. Native vegetation will be planted to fill the voids left by construction. The cabins will be winterized for more efficient operation at the beginning and end of the visitor season, low flow plumbing fixtures will be utilized and design considerations will be incorporated to accommodate the handicapped in some units.

Removal of the 30 frame and 10 log cabins will be accomplished as described under Alternative 2. This will require a new memorandum of agreement with the Arizona State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation, and will be carried out in consultation with those parties. The NPS employees will be relocated to the existing NPS housing area which will be redesigned to accommodate the additional employees. As prescribed in both Alternatives 1 and 2, the Inn will undergo external restoration and internal rehabilitation in accord with a Historic Structures Report to be accomplished by NPS in consultation with the Arizona SHPO. Also, the four frame cabins immediately behind the North Rim Inn would be retained as concession employee housing for those employees working in the North Rim Inn area and to retain the historic integrity of the Inn.

Expansion and reconfiguration of the existing campground to add 50 units would be accomplished as described under Alternative 2. Also, relocation of the laundry/shower building and the dump station, plus the provision of a campground registration station and new entrance kiosk, would be accomplished as described under Alternative 2.

The corporation yard requirements under this alternative would essentially be the same as for Alternative 2.

**Grand
Canyon
Lodge Area**

Proposals for improvements in traffic circulation, parking, an additional comfort station and reconfiguration of uses within the Grand Canyon Lodge are identical to those described under Alternative 2 (See Map 7).

**Master Plan
Consistency**

The expansion of camping units and traffic improvements to alleviate congestion are consistent with the Master Plan. The proposed lodging units, with their detached cabin design, would continue the traditional type of accommodation. However, their construction would extend somewhat outside the existing developed area -- an inconsistency with the Plan. Also, the number and location of the new accommodations may or may not be consistent with maintaining a relaxed pace with no significant loss of natural or traditional values, depending on individual viewpoints. Therefore, this alternative also would constitute an amendment to the Master Plan from the standpoint of better definition of the plan and/or redefinition, as necessary, to address current needs and planning considerations.

ALTERNATIVE 4 - CAMPGROUND EXPANSION ONLY

Under this alternative, the existing campground would be expanded by 80 units. Overnight lodging would remain at the current level of 201 units although a few additional units may become available as concessioner employees are moved to new housing. Additional lodging demand would have to be met on the national forest lands to the north or elsewhere outside the park. As prescribed under Alternative 2, improvements in traffic circulation and parking would be made in the Grand Canyon Lodge area. The additional camping units would be considered a ceiling on that type of use for the North Rim. Any future consideration of lodging expansion would require new studies and environmental analysis subject to public review and comment.

North Rim Inn Area

The existing 83 unit campground would be expanded by 80 units and consist of 95 tent and 68 RV spaces for a total of 163 units. The existing campground would be reconfigured and the expansion would take place in two areas. The first would be located north and west of the existing campground and the second would occur in the area between the main park entrance road and the existing campground (see Map 9). The existing amphitheater would be retained and existing group campsite redesigned as described under Alternative 2. Four new comfort stations would be provided and natural vegetation would be utilized for screening to the greatest degree possible.

Rehabilitation and future use of the North Rim Inn and adjoining four cabins would be identical to Alternatives 2 and 3 except that a snack type food service would be installed in the section of the Inn that now serves as an employee lounge. The employee lounge would be relocated to the new concessioner housing area located in lower Transept Canyon. The 30 frame cabins serving as concessioner housing would be immediately removed to allow for the campground expansion. The 10 log cabins serving as NPS housing eventually would be removed as new housing becomes available. Both would be treated as described under Alternative 2. The NPS employees would be relocated to the existing NPS housing area, as described in Alternative 2, when the 10 cabins are removed.

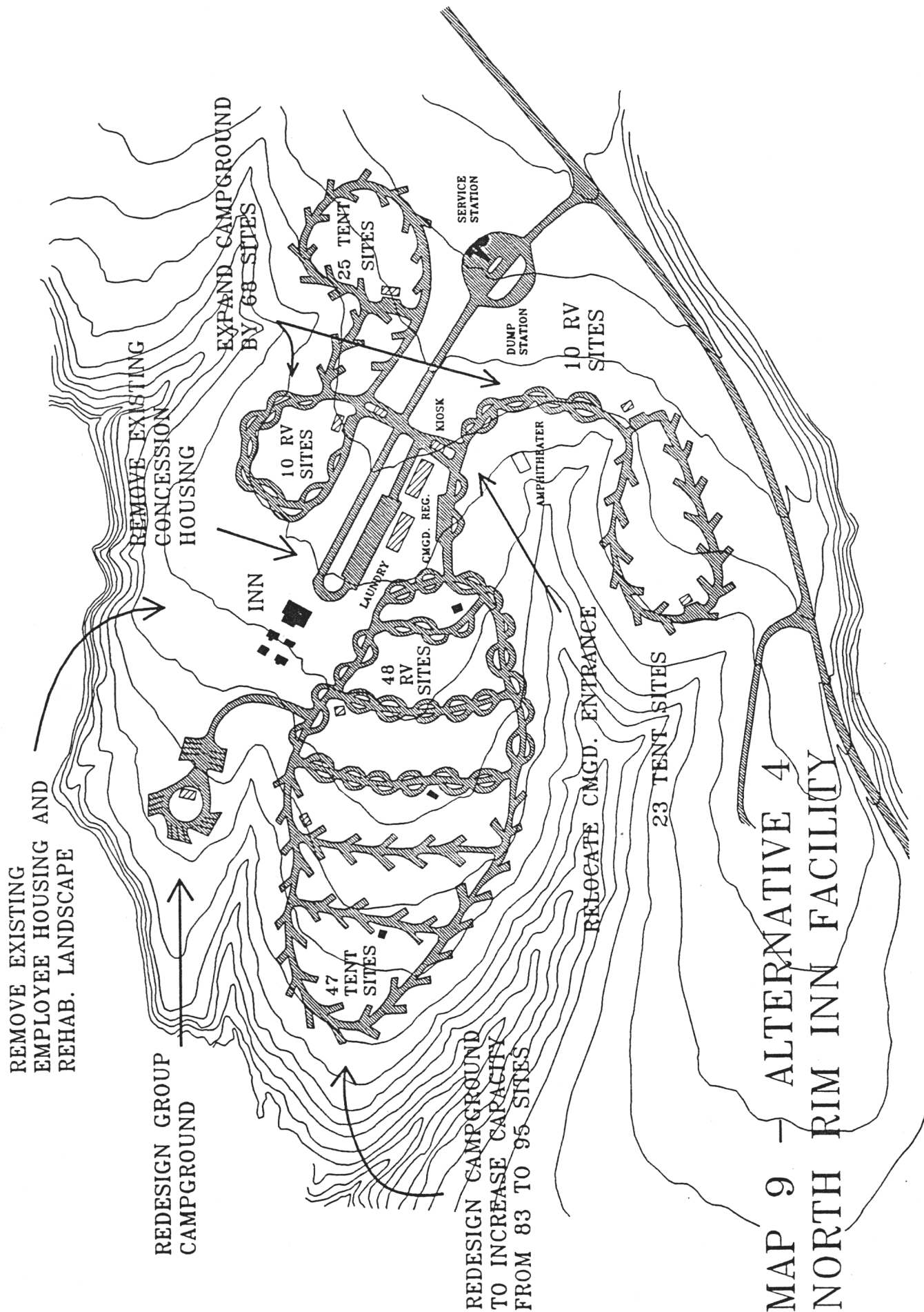
The laundry/shower building and dump station would be relocated and the camper registration station and new entrance kiosk constructed as described under Alternatives 2 and 3. An additional entrance kiosk would be provided at the entrance to the new camping area located north and west of the existing campground. Utilities will be sufficient to handle the expansion. Construction material and storage requirements for this alternative can be handled on site without disruption to ongoing visitor use.

**Grand
Canyon
Lodge Area**

Proposals for improvements in traffic circulation, parking, an additional comfort station and reconfiguration of uses within the Grand Canyon Lodge are identical to those proposed under Alternatives 2 and 3.

**Master Plan
Consistency**

The actions proposed under this alternative most closely approximate those set forth in the Master Plan. The campground expansion is within the 100 unit limit set by the plan but extends slightly outside the existing developed area. The traffic improvements to relieve congestion would contribute to the maintenance of a relaxed pace.



MAP 9 - ALTERNATIVE 4
 NORTH RIM INN FACILITY

ALTERNATIVE 5 - TRAFFIC IMPROVEMENTS ONLY

Under this alternative, no additional overnight lodging and camping would be provided. There may be a modest increase in the number of lodging units available through vacating of units now occupied by concession employees as new housing is completed. However, the number of units would remain close to the current level. Demands for additional lodging and camping would be met, in part, by proposed expansion on adjoining national forest lands or elsewhere outside the park. As prescribed under Alternative 2, improvements in traffic circulation and parking would be made in the Grand Canyon Lodge area and the existing North Rim Inn campground would be reconfigured to separate tent and RV campers and to improve circulation.

North Rim Inn Area

The existing 83 unit campground would be reconfigured to separate tent and RV campers and to improve circulation. A camping registration station and new entrance kiosk would be constructed and the group camp redesigned to reduce impact on natural resources. The amphitheater will be maintained on its present site as will the existing laundry/shower building. The dump station would be relocated as described under Alternatives 2 - 4. The North Rim Inn would be restored, as described under Alternatives 1 - 4, and utilized both as a camper store and for snack service as described under Alternative 4. The four adjoining log cabins would be retained for concession housing. The 10 log cabins located west of the Inn and the 30 frame cabins north of the Inn would be treated as described under the no action alternative (Alternative 1) in consultation with the Arizona State Historic Preservation Officer and Advisory Council on Historic Preservation. Requirements for storage of construction materials and equipment would be minimal and handled at the work sites.

Grand Canyon Lodge Area

Proposals for improvements in traffic circulation, parking, an information station and restroom facility and reconfiguration of uses within the Grand Canyon Lodge are identical to those proposed under Alternative 2 except that registration for overnight lodging would be retained.

**Master Plan
Consistency**

This alternative most closely approaches a minimum requirements proposal, an identification normally made by the NPS in its major planning efforts. It is consistent with the Master Plan to the extent that efforts would be made to reduce congestion and promote a more leisurely experience. The major departure is the elimination of campground expansion. Adoption would constitute an amendment of the plan.

ALTERNATIVES CONSIDERED BUT REJECTED

In the 1972 Comprehensive Design Plan for the North Rim, the proposed action called for the placing of the new lodging units at upper Transept Canyon with the North Rim Inn area relegated solely to campground expansion. In the 1988 Development Concept Plan and Environmental Assessment, the upper Transept Canyon site was offered as an alternative with the proposal changed to providing the lodging units at the North Rim Inn site similar to the current proposal outlined under Alternative 2. This change was made because of a desire to keep any new development within the existing developed area "footprint" and away from the rim of the Grand Canyon proper, and because of the added expense of extending utilities and road access improvements to the upper Transept Canyon site. The public review of the 1988 plan did not produce a single letter or comment in support of the upper Transept Canyon site and the NPS still considers it unacceptable for the reasons given above. Consequently, this alternative has been rejected from further consideration in this plan and environmental impact statement.

Another alternative for providing additional lodging is the on site reuse of the existing 30 frame cabins, located adjacent to the North Rim Inn, for this purpose. While this would preserve the historic scene, the cabins are in such poor condition, and are of size and cramped layout as to be inappropriate for contemporary expectations of travelers throughout the hospitality industry. Therefore, this option has been rejected from further consideration.

The public response on the 1988 Development Concept Plan raised two additional options that are not covered in the five alternatives evaluated. The first was to remove all structures from the North Rim and restore it to natural conditions. This was rejected because lodging, camping and other visitor services have been a historic part of the North Rim experience which is intended to be more than day use. Also, the area is remote from communities and visitor support services that are both necessary and desirable. Additionally, most of the existing visitor-oriented facilities are located in structures of historic significance that should be retained and used in an adaptive manner to the greatest extent possible.

The second suggested alternative was to replace the small cabins in the vicinity of the Grand Canyon Lodge with new lodging. These cabins comprise part of the Grand Canyon Lodge Historic District and have been renovated for continued use for visitor lodging. Consequently, their replacement with new lodging would be neither prudent nor in compliance with Section 106 of the National Historic Preservation Act.

In addition to the above-mentioned rejected alternatives, the possibility of locating new lodging and campsites more remote from the rim area but within the park needs to be addressed. This option was not further evaluated as existing utilities would have to be extended, the existing development "footprint" would be extended, new access roads may have to be developed, some existing services may have to be duplicated, and visitors lodged more distant from the prime scenic attractions could tend to aggravate rather than resolve existing congestion problems in parking and circulation. Use of existing and expanded facilities on the adjoining national forest would be more prudent than seeking an alternative park development site remote from the existing North Rim development.

AFFECTED

ENVIRONMENT



III. AFFECTED ENVIRONMENT

INTRODUCTION

In addition to environmental information on the Bright Angel Point area of Grand Canyon National Park, this section also will provide limited information on the environment of national forest lands to the north where the Forest Service proposes expanded development. This information is provided primarily for comparative purposes and more specific affected environment information on Forest Service development sites would be provided in that agency's own environmental analysis at such time the locations and degree of proposed development are determined.

NATURAL ENVIRONMENT

Vegetation

The forest cover on Bright Angel Point is a broadly encompassing montane forest, best characterized as a ponderosa pine/aspen association. White fir and spruce are beginning to invade this association at this elevation. The forest is open, with scattered perennial bunch grasses, shrubs and forbs.

Warm, drying canyon updrafts at the rim provide a suitable environment for species such as pinon pine, generally found in warmer, drier, lower environments. This situation produces abrupt changes between species characteristic of semiarid and of moist, humid areas, without an intervening transition zone. Such an association lies on the upper west-facing slopes of the canyon rim looking into Transept Canyon.

Potential threatened and endangered plant species for the area include Arizona leather flower (category 1 - proposed for listing with supporting data obtained), Grand Canyon rose (category 2 - proposed for listing without supporting data), Tusayan flame flower (category 2), cliff milk vetch (category 2), Kaibab bladderpod (category 2) and Kaibab paintbrush (category 2). None of these are known to occur in the developed area of the North Rim covered by this plan proposal.

On the national forest lands to the north, the Kaibab Lodge vicinity is primarily spruce-fir forest containing predominantly Engelmann and blue spruce with some white, Douglas and subalpine fir, and aspen invading openings within the forest and meadows. The area surrounding Jacob Lake is predominately ponderosa pine.

Wildlife

While the canyon and the Colorado River have been a barrier to the dispersal of some mammals, all but 11 species found on the North Rim are also found on the South Rim, the Kaibab squirrel being the most notable exception.

Some mammals common to the North Rim include: Kaibab squirrel, porcupine, red squirrel, Uinta chipmunk, deer mouse, mule deer and bobcat. More complete descriptions of the total faunal representation are given in Bailey (1939), Hoffmeister (1971), Rand (1958), and Gehlbach (1966).

The birds which can be classified as common or abundant on the North Rim include the sharp-shinned hawk, red-tailed hawk, sparrow hawk, blue grouse, mourning dove, great-horned owl, white throated swift, black-chinned hummingbird, broad-tailed hummingbird, red-shafted flicker, Williamson sapsucker, hairy woodpecker, violet-green swallow, Steller's jay, common raven, pinyon jay, Clark's nutcracker, mountain chickadee, common bushtit, white-breasted nuthatch, red-breasted nuthatch, pygmy nuthatch, rock wren, robin, hermit thrush, western bluebird, mountain bluebird, ruby-crowned kinglet, western tanager, blackheaded grosbeak, evening grosbeak, rufous-sided towhee, green-tailed towhee, Oregon junco, grayheaded junco, chipping sparrow, and song sparrow.

The tiger salamander is found on the North Rim; however, it is found only in the vicinity of sinkholes such as Greenland Lake. No other amphibians are common. In the reptile class, the most common lizards in the area are the short-horned, sagebrush, fence, plateau, shiptail, and western skink. Snakes which can be expected in the area are the gopher snake, the garter snake and the king snake.

Listed and potential threatened and endangered species with the potential to be present in the general area include peregrine falcon (endangered), bald eagle (endangered), Mexican spotted owl (category 2 - proposed for listing without supporting data), and spotted bat (category 2).

Kaibab squirrels and goshawks are considered sensitive species by the park. None of these species are known to be present in the developed area of the North Rim covered by this plan proposal. While the ponderosa pine forest of the developed area on Bright Angel Point does contain potential habitat for the Mexican spotted owl, none have been reported in the area. Peregrine falcons nest on cliff faces below the rim and potentially could fly by or through the area. Baseline information on goshawks is unavailable.

Most of the above-identified species could also be expected to be present on adjoining national forest lands. The Forest Service is working with the Arizona Game and Fish Department on surveys to ascertain the presence or absence of the Mexican spotted owl.

**Geology and
Topography**

The area where the existing and proposed developments are located is on the narrow Bright Angel peninsula (approximately 1 and 1/2 miles long by 1/4 mile wide) that juts into Grand Canyon from the North Rim. It is a continuation of the Kaibab Plateau, one of the highest of the several Colorado Plateaus in southwestern Colorado, Utah, New Mexico, and northern Arizona. This plateau is underlain by horizontal layers of uniform Kaibab limestone almost 250 feet thick.

Bright Angel Point is fairly level, sloping slightly to the south and toward the canyon rims on both the east and west sides. The crystalline and coarse-textured soils derived from the Kaibab limestone are classed as grayish brown podzolic soils. Although they are shallow, they are very permeable and, because of their coarse textures, they drain easily. Mulch generally occurs only where there is an accumulation of pine needles or debris from trees.

The adjoining national forest lands to the north are also part of the Kaibab Plateau. The area lacks perennial streams in that the underlying soils and rock formations act as a giant sponge. Consequently, water availability is a major concern in developing water supplies for visitor accommodations in this area.

**Climate and
Air Quality**

The climate of the North Rim and adjoining Kaibab Plateau is typical of that found at 8,000 to 9,000-foot elevations in many mountainous regions of the western United States.

Winters are cold, with abundant snowfall. Summers are cool, with short high-intensity thunderstorms. The average yearly precipitation recorded at the North Rim ranger station during a 30-year period is 25.3 inches, and the mean monthly temperature is 43.1 degrees F.

Grand Canyon National Park is classified as a class 1 air quality area in accordance with the Clean Air Act of 1977 as amended. This classification allows the least increase in ambient levels of pollution.

**Aesthetic
Values**

The North Rim of the Grand Canyon is noted for its rugged and primitive nature. The only development on the North Rim occurs at Bright Angel Point, a relatively limited area, which contains the main access road and all visitor and administrative services. All lands outside the 200 foot right-of-way along the paved roads are managed as primitive backcountry.

On the Kaibab National Forest to the north, the only development is at Kaibab Lodge and Jacob Lake, located 25 miles apart and 5 and 30 miles north, respectively, of the park boundary. State Route 67 (Jacob Lake to the North Rim) is designated both as an Arizona State Parkway and a Forest Service National Scenic Byway. These designations result from numerous articles written for national magazines about the attractiveness and significance of the drive to the North Rim being as important as the visit to the North Rim proper.

CULTURAL RESOURCES

A number of site surveys have been conducted in the North Rim region. An archeological survey of the North Rim developed area was completed in 1975 to assess the effects of a proposed Draft Development Concept Plan for the North Rim. Additional surveys were conducted in the North Rim developed areas during the years 1985 to 1987, in preparation for Grand Canyon Lodge and cabin rehabilitation, and replacement of the North Rim electrical system. One archeological site was discovered in the vicinity of the rim trail, at Transept Canyon.

Several areas of the North Rim Development complex are listed on the National Register of Historic Places as a result of the regional and local significance of their architectural styles, and their usefulness in interpreting park

development, land use and history. In 1987, the Grand Canyon Lodge was given National Historic Landmark Status. The District includes the Lodge itself and all associated cabins, totaling 114 buildings. The North Rim Inn and Campground Historic District includes the Inn building and associated log cabins and exposed frame cabins, for a total of 45 structures. Most of the National Park Service residences and administrative buildings are part of the North Rim Headquarters Historic District that contains a total of 19 buildings. Most of the historic structures on the North Rim were constructed in the 1920's and 1930's by the Utah Parks Company and the NPS.

In 1982, the draft comprehensive design plan for the North Rim was submitted for consultation in accordance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, *Protection and Enhancement of the Cultural Environment*. Following the preparation of a Preliminary Case Report and on-site consultation, a Memorandum of Agreement (MOA) was approved between the National Park Service, Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation on January 8, 1983. A copy of the MOA is attached as Appendix B. Since 1983, the agreement has been followed with particular progress being made regarding the Grand Canyon Lodge Historic District in the rehabilitation of historic structures under the National Park Service's Visitor Facilities Fund Program. In the North Rim Inn and Campground District, the 1983 MOA made provision for the removal of the log cabins and exposed frame cabins, now used for NPS and concessioner employee housing, because of their deteriorated and substandard condition. This condition has not changed appreciably. The Historic Districts on the North Rim have also been recorded under the Historic American Building Survey Program with records being deposited in the Library of Congress.

On the adjoining national forest lands, in the areas now used and proposed for expansion of visitor facilities, additional cultural resource surveys will be needed once the siting of proposed expansion facilities is determined. Cultural sites do exist at DeMotte Park and it is possible that some of the buildings at both Kaibab Lodge and Jacob Lake may have historical significance.

SOCIOECONOMIC ENVIRONMENT

Existing Visitor Development and Use

The visitor use season at the North Rim of Grand Canyon National Park presently extends from mid-May to late October. Heavy snows during the remainder of the year preclude visitor access by road to this area of the park. All visitor facilities are concentrated on Bright Angel Point in two distinct areas. The first, located at the tip of Bright Angel Point, includes all the overnight accommodation cabins and the historic Grand Canyon Lodge, which houses a restaurant, cafeteria, lounge, restrooms, curio shop, accommodations registration service and NPS information desk. The second area, located a short distance north and on the west side of Bright Angel Point, contains the historic North Rim Inn, individual and group campgrounds, service station and laundry facilities.

Historically, there were slightly over 300 guest accommodations associated with the Grand Canyon Lodge and North Rim Inn. The Grand Canyon Lodge area, at the tip of Bright Angel Point, included about 124 rustic log cabins containing approximately 258 units. An additional 45 units, in single unit frame and duplex log cabins, were associated with the North Rim Inn complex. Over a period of time, some of the Lodge and all of the Inn cabins were utilized for storage and employee housing while two employee dormitories were converted into two 20 unit motels totalling 40 units. Other cabins have been removed to provide access for fire suppression equipment and some of the duplexes are rented as singles. The North Rim Inn, formerly a cafeteria, now houses a camper store and employee lounge. At present, there are 201 units, accommodating approximately 600 people, that are consistently available for overnight visitor use at the North Rim. During peak periods when all lodging units are full, the concessioner's most recent estimates (1988) indicate a turnaways ranging from 70 to 90 rooms per day.

CURRENT OVERNIGHT ACCOMMODATION CONFIGURATIONS			
Number of Units	Type of Unit	Units/ Building	Total Bldgs.
56	Western/ Deluxe Cabins	2 or 4	23
21	Pioneer/ Budget Cabins	1	21
84	Frontier/ Budget Cabins	2	42
40	Motel	20	2

The condition of these buildings was assessed through a fire and safety evaluation conducted by the Denver Service Center in June, 1981. The report summarizing the evaluation concluded that the concession-operated buildings including the Lodge, cabins, and motel units at the tip of Bright Angel Point were in generally good condition. A three year maintenance and rehabilitation project was recently completed on the Grand Canyon Lodge and cabins and the North Rim Inn through the National Park Service's Visitor Facility Fund. (Note: The Visitor Facility Fund reinvests concessioner franchise fees in upgrading National Park Service owned visitor facilities.)

Automobiles in front of, and in the immediate vicinity of, the Grand Canyon Lodge contribute significantly to congestion. Traffic is not only an aesthetic annoyance but also a safety hazard to pedestrians in the area. All visitor services including room registration, horse/mule canyon tours, and NPS information/orientation are centrally handled in the Lodge building, further adding to the congested conditions at the tip of Bright Angel Point.

Visitor facilities serving the camping and motoring public are located further north on Bright Angel Point in the vicinity of the historic North Rim Inn. This building presently houses a camper services store and the North Rim Pub and Game Room. Associated with the Inn are a 83 unit campground, a four unit group campground, a laundry/public shower

facility, an amphitheater, and a gasoline/auto repair station. Demands for campsites greatly exceed the available supply throughout the summer use season. During peak periods when the campground is full, turnaways range from 80 to 100 campsites per day. Tent and RV campsites are not segregated.

Visitors who cannot obtain campsites or lodging in the park have the now limited option of staying at facilities on the adjoining Kaibab National Forest at Kaibab Lodge/DeMotte Park or at Jacob Lake located 18 and 43 miles respectively north of the North Rim development. Kaibab Lodge has 22 leaseholder operated lodging units and a 22 unit Forest Service campground at nearby DeMotte Park. Jacob Lake has 35 leaseholder operated lodging units, an RV park with 80 full service and 50 tent camping sites on private land, and a 53 unit Forest Service campground. Both the Jacob Lake and Kaibab Lodge lodging facilities are open to year around use, with Kaibab Lodge to a more limited extent.

Informal Forest Service surveys indicate that the bulk of users of the Jacob Lake and Kaibab Lodge facilities during the summer months are in the area to visit the North Rim of the Grand Canyon. Outside of the summer season, users of the facilities are primarily attracted by hunting and winter use opportunities on the national forest. The Forest Service reports that during the peak summer season, Kaibab Lodge experiences a 95% occupancy rate with approximately 50 turnaways on full days. Jacob Lake experiences a 92% occupancy rate with 50 to 100 turnaways on full days. DeMotte campground near Kaibab Lodge is full 90% of the time and the campgrounds at Jacob Lake are full 95% of the time. Camping also is allowed on unimproved sites on the national forest and a considerable amount of this use also takes place.

The 1987 Final Kaibab National Forest Plan and 1989 Plan Amendment prescribe expansion of visitor facilities by approximately 93 lodging units and 100 camping units over the next four to ten years on the North Kaibab Ranger District. Emphasis on this expansion will be placed on the Kaibab Lodge area where an additional 53 lodging units and from 53 to 58 camping units are planned within the next four to seven years. The new leaseholder of the existing facility, who will be carrying out the lodging expansion, intends to emphasize the lodge as a year around destination resort in its own right rather than relying on spin-off business from visitors not able to secure lodging

within the park. Jacob Lake expansion will be in the form of about 40 additional lodging units with no campground expansion and will occur in the more distant future. In addition to the new lodging and camping facilities, the Forest Service plans to construct a visitor center at Jacob Lake. Information on visitor accommodation within the park is now available at the Jacob Lake Lodge and this function will continue at the new center with the potential for additional park visitor information depending on space availability and arrangements made between the two agencies.

**Park
Maintenance,
Housing and
Administrative
Functions**

National Park Service and concession maintenance functions are located at two separate locations in a variety of buildings. The concession maintenance area at lower Transept Canyon consists of a carpenter shop, laundry buildings, generator building and several storage structures. National Park Service maintenance facilities at the North Rim headquarters area include a machine shop, gas station, fire station, offices, equipment storage buildings, stock corrals and adjacent helicopter landing pad. National Park Service vehicle maintenance is located within the concessioner's maintenance area at lower Transept Canyon. Lack of sufficient storage for both NPS and concessions operations and maintenance is a concern due to the North Rim's long distance from major supply and repair services. Many of the structures in both maintenance areas are substandard and are scheduled for extensive repairs.

Employee housing for both National Park Service and concession employees has been scattered throughout the developed area - at the Grand Canyon Lodge, North Rim Inn, the concessioner's maintenance area, and the National Park Service administrative area. Employees are housed in single family units, house trailers, cabins, and dormitory space. Concession employees number approximately 170 for the summer visitor use season. National Park Service personnel number 12 permanent staff and 45-50 seasonal personnel employed for the visitor use period. Much of the present housing, particularly the frame and log cabins at the North Rim Inn location, is dilapidated and in need of replacement. New concessioner housing has been placed in the lower Transept Canyon area of Bright Angel Point. This allows movement of concessioner employees out of the North Rim Inn frame cabins and reduction of doubling up in other facilities that are more desirable for single occupancy.

National Park Service administrative headquarters are located in a small cluster of frame buildings adjacent to the park maintenance facility. Limited visitor information and backcountry reservation services are located with the administrative office. The original building was destroyed by fire during the winter of 1981-82, and has been replaced by a modular structure. Although this location is suitable for administrative functions, it is relatively remote from the flow of visitor traffic. It is missed by most park users who continue to the Grand Canyon Lodge to obtain park information.

An area immediately north of the Grand Canyon Lodge cabin/motel complex on the Transept Canyon rim has historically been utilized as a staging area for construction activity and materials delivery by helicopter and as a recreation area for Lodge guests and employees. This area, called upper Transept Canyon, is several acres in extent and cleared of trees and shrubs. It is presently used as a recreation area by North Rim employees.

Utilities.

Water Supply: The water supply for all of Grand Canyon National Park, both the North and South rims, comes from Roaring Springs Cave, located north of Bright Angel Point and approximately 3180 ft. below the North Rim. While very little data exists on the cave's flow rate, flow measurements from September, 1986, indicated a discharge of 1458 gallons per minute (gpm). Flow varies throughout the year with high flows in April and May during snow melt, then tapering off to a fairly constant flow with the minimums in September and October. The September, 1986 flow was considered below normal for that time of year.

The September, 1986, flow measurements also indicated that the NPS was diverting 55% of the flow from the cave. This represents a maximum percentage of diversion of total flow as September is the time of minimum flow and the 1986 flow rate was considered below normal. The raw water pipeline can divert between 700 - 800 gpm with the amount of water used depending on downstream pumping operations. The diversion is a constant. Historically, during the period May through October, a water demand of 72 gpm is required to support the North Rim. To meet this demand, water is tapped from the raw water pipeline,

directed to the Roaring Springs pump station and pumped to the North Rim. The Roaring Springs pump station has a pumping capacity of 94 gpm. The remainder of the diversion flows by gravity to the Indian Gardens pump station, located on the opposite side of the Grand Canyon, where it is then pumped to the South Rim. The non-diverted remaining flow from Roaring Springs Cave cascades about 500 feet down a slope to Roaring Springs Creek, a tributary of Bright Angel Creek. This residual flow has been estimated at 657 gpm during low flow periods. Roaring Springs Creek continues approximately 1/4 mile down the North Rim slope to the confluence with Bright Angel Creek which then drops 2500 feet in nine miles to the confluence with the Colorado River at Phantom Ranch. At Indian Gardens, the unused diverted flow not pumped to the South Rim goes into Garden Creek and then to the Colorado River. This augmented flow ranges from two to four times the natural flow of Garden Creek.

The North Rim water supply is pumped to the North Rim from the Roaring Springs pump station, constructed in 1978, through a 3 1/2 inch, 12,500 foot steel pipe installed in 1928 by the Utah Parks Company. The pump station is located 3525 feet below the North Rim. The terminus of the pipeline is two 2.0 million gallon above ground tanks. The available storage volume is 3.9 million gallons, enough for a 38 day supply under current average daily peak month demand. Water is distributed throughout the North Rim developed area by a system of small diameter pipes, composed of cast iron, galvanized steel and polyethylene materials. Originally installed by the Utah Parks Company in 1928, improvements were subsequently made to extend the system to the NPS campground and headquarters area. Since the average burial depth for the pipes is 30 inches, most of the system is subject to freezing and must be drained each fall then reactivated in spring.

The water source for the fire protection system is reclaimed sewage effluent that is stored in a 0.3 million gallon above ground tank located adjacent to the sewage treatment plant. The distribution system consists of an 8 inch line and 13 hydrants. Installation of this system allowed the abandonment of the original six inch cast iron fire main which was leaking.

At the Roaring Springs pumping station, the two positive displacement plunger pumps are rated at 97 gpm at 205 rpm. However, recent measurements indicate that the pumping rate is limited to 94 gpm. At present, the pumps average 72 gpm to satisfy current demand. The transmission pipeline is capable of transporting a flow of 102 gpm without extensive pipeline replacement or rehabilitation. While the pipe itself is structurally sound, its supports are susceptible to damage from erosion, washouts, freeze/thaw cycles and rock slides. A "typical small" break or leak normally takes two to three days to repair. The contingency for such breaks is the 38 day water supply contained in the two storage tanks on the North Rim. A problem is that these tanks presently do not have sufficient level control to prevent overflows.

In the water distribution system, a leakage of 27,717 gallons per day (gpd) was being experienced before and up to 1986. Through an intensive monitoring program, substantial exfiltration was detected in the old cast iron fire main which was installed in 1936. With the initiation of use of reclaimed sewage effluent for fire protection, the old main was abandoned. Most recently, the concessioner, TWR Services, began replacement of a significant portion of the older water lines serving the cabins near Grand Canyon Lodge. The overall result has been a reduction of approximately 17,000 gpd in daily water loss that was experienced in 1986 and before.

For comparison purposes, the areas proposed for new visitor development by the Forest Service on the North Kaibab Ranger District are located on Kaibab Plateau which lacks water because of its geologic feature of absorbing precipitation like a giant sponge. There is little if any surface water. Consequently, water availability is a concern in lodging development particularly in the Kaibab Lodge/DeMotte Campground area. DeMotte Campground and Kaibab Lodge currently have 30,000 gallon and 50,000 gallon storage tanks respectively, and smaller storage facilities at nearby businesses (country store/horseback rides). It is likely that innovative catchment systems will have to be employed at the lodge and campground in order to

provide adequate supplies for facility expansion. Also, water storage capacities will need to be developed for additional expansion. Water supply and storage are not limiting factors for expansion at Jacob Lake.

Sewage Treatment: The sewage treatment system underwent extensive rehabilitation from 1972 to 1987. The project consisted of a new secondary treatment facility, replacement of 2 pumping stations and new sewers and manholes. The sewage collection system in the Western/Deluxe cabins of the Grand Canyon Lodge area was replaced in 1983 and the replacement of the sewage collection lines in the adjacent budget cabins currently is at or nearing completion.

The treatment plant is located south of the park maintenance and housing development, approximately 1/8 mile from the Transept Canyon rim, and consists of one large building with the remainder of the plant open to the elements. There are four lift stations that collect and pump sewage within the collection system and sewage then flows by gravity to the treatment plant. Discharge from the plant is to Bright Angel Creek, located in Transept Canyon. Governed by the guidelines of the National Pollutant Discharge Elimination System, the discharge is controlled by a permit from the State of Arizona and monitored by the Arizona Department of Health Services. The sewage treatment facility presently operates at optimum capacities and is meeting all effluent requirements. Current average influent flow is 76,000 gpd compared to a design capacity of 100,000 gpd average flow.

The present sewage treatment process is not designed to function effectively under winter conditions. Therefore, a septic tank is used for wastewater treatment between the months of October and May to serve NPS staff stationed on the North Rim during the off season. The existing septic tank/soil absorption field capacity is limited. Expanded winter use of the North Rim facilities would require expansion of this system or major modifications in order to winterize the existing facility.

For the existing visitor facilities on the national forest, sewage treatment at Jacob Lake is provided at a central plant that will be operated in the future by Jacob Lake Inn. DeMotte Campground uses vault

toilets and a leach line for the flush toilets. Proposed expansion at Kaibab Lodge will require a new treatment system, most likely a septic tank - leach line system.

Electrical System: Power for the North Rim is obtained by the NPS from the Garkane Power Association, Inc. A contract was awarded in 1987 to replace the existing aerial primary and secondary power lines throughout the developed area with a totally underground system. This contract provides for adequate and reliable service for all North Rim developed areas, as well as the Roaring Springs pumphouse. The new system includes an emergency generator back-up system. The electrical system rehabilitation is expected to be completed by the end of 1990.

ENVIRONMENTAL CONSEQUENCES



IV. ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 - NO ACTION

Impact On The Natural Environment

Wildlife. There will be no new impacts on wildlife habitat or populations from project-related construction. To the extent that existing uses degrade soils and plant communities, there could be long term loss of some habitat. Also, increased visitor day use eventually could impact wildlife and wildlife habitat over time.

Vegetation and Soils. There will be no construction caused removal of vegetation or disturbance of soils. If no modifications are made to existing campground configurations, there could be both long term and short term compaction of soils and loss of vegetation from overuse of some areas. The same may be true in those areas adjacent to existing parking lots where "volunteer" trails could become more numerous without strict controls as day use numbers increase.

Threatened and Endangered Species. The potential threatened and endangered species identified for the North Rim under *III. AFFECTED ENVIRONMENT*, have not been reported for the developed area of Bright Angel Point and immediate adjacent areas. There will be no impact.

Water Resources. The current development on Bright Angel Point is not situated in or on any floodplain or wetlands. Water supply withdrawal of 72 gallons per minute will continue from the park's water source at Roaring Springs Cave to supply the existing visitor and employee support services. Over the long term, some increase in the withdrawal for park use will occur to account for increased day use both from new overnight accommodations outside the park and increases that might occur independent of new accommodations (see impact analysis for Alternative 2, following, for the expected impact on the water source from any potential increases).

Aesthetic Values. No new visual intrusions will occur and the overall ambiance of the North Rim developed area will not change. Continued congestion in the vicinity of Grand Canyon Lodge can detract from the visual qualities of that area, particularly on peak use days. This can deteriorate further as day use numbers increase from new visitor

development outside the park and from other sources. The lack of segregation between tents and RV's in the existing campground may have aesthetic impact on some users. Also, there is some congestion in the vicinity of the North Rim Inn that may be detracting to some users. In addition, the employee frame and log cabins, located to the north and west of the Inn, may appear as rustic in some perceptions but as an eyesore to others.

Air Quality. Continued vehicle congestion, particularly in the vicinity of Grand Canyon Lodge, may cause some degradation in air quality on peak use days or as overall day use levels increase. Otherwise, there will be no impact.

Summary. No new impacts to natural resources will occur from construction or other displacement. Without modifications to the campgrounds, some short and long term adverse impacts may accrue to soils and vegetation in parts of those areas from overuse. There will be no further impact on the Roaring Springs water source. The overall appearance of the area will remain the same but future periodic degradation of visual qualities and some plant and wildlife values may result from additional day users in an already congested environment on peak use days. The same can be said of air quality impacts.

**Impact On
Cultural
Resources**

Historic Resources. All of the historic structures within the North Rim Inn and Grand Canyon Lodge historic districts will remain intact, at least over the short term, and the rehabilitation work on the North Rim Inn will continue. The uses also will remain the same except for the 30 frame and 10 log cabins used for concession and employee housing in the North Rim Inn vicinity. The 30 frame cabins currently are being vacated as the new concession employee housing is completed. These cabins are not considered suitable for reuse as visitor lodging and will remain vacant. The 10 log cabins also are not suitable for rehabilitation and the current NPS occupants will be moved at such time new housing becomes available. Consequently, over the long term, all or some of the frame and log cabins may be removed from the site. Both environmental and historic preservation compliance would be required for such action at the time it is contemplated.

Without any improvement to traffic flow conditions, congestion would detract from the historic scene, particularly at Grand Canyon Lodge but also at the North Rim Inn.

Archeological Resources. Only one known archeological site is within the North Rim developed area and that is well removed from any existing facilities. Since no new development will occur, there will be no impacts to potential unknown sites.

Summary. The historic districts and associated structures will not be impacted, at least over the short term. Visitor congestion can detract from the historic scene. There will be no impacts to archeological resources.

**Impact On
Socioeconomic
Environment**

Visitor Use. For the long time users accustomed to the area, the historic scene will be maintained. Because of the limited number of overnight visitors to the area, this could be particularly rewarding to those who are able to secure either camping or lodging accommodations. Congestion in the Grand Canyon Lodge area in particular will continue with poor traffic circulation and overtaxed food and other visitor facilities. These conditions could be expected to deteriorate as levels of day use increase, both from new lodging and camping developed on adjoining national forest lands and from other sources.

Based on existing unmet lodging demands in both the park and for existing facilities on the national forest (see *III. AFFECTED ENVIRONMENT, Socioeconomic Environment, Existing Visitor Development and Use*), competition for lodging will be keen. This will be particularly true for accommodations in the park for those potential visitors who both do not wish to stay outside and "commute" to the park and prefer to experience the "moods" of the Grand Canyon over a 24 hour period. While camping facilities may be slightly easier to find in the general area after the Forest Service expansion, competition for the existing units available within the park will be stiff for the same reasons stated above.

While the planned lodging expansion on the national forest (93 units) could cover present unmet peak demand in the park (70 to 90 room shortfall per day), it does not allow for unmet demand now experienced at Kaibab Lodge and Jacob Lake (50 turnaways per day at Kaibab and 50 to 100 at Jacob Lake during peak periods). Also, the lodging shortfall in the park could impede the development of the national forest and associated leaseholder visitor facilities as attractions in their own right instead of as adjuncts to the park visitor during the peak summer season. Over the

longer term, this could create pressure to expand the national forest visitor facilities further with the potential of detracting from the highly scenic road corridor from Jacob Lake southward and straining water supply and sewage treatment capacities.

Except for the congested conditions in the vicinity of Grand Canyon Lodge, the past increases in day use have not reached a point at which controls of that use need to be developed. With exclusion of traffic improvements and any further development of lodging and camping units in the park, combined with development of these facilities on the national forest, day use has a high potential to increase to the point that some sort of controls, particularly for auto traffic, will be needed. If additional accommodations are provided within the park, users of the new facilities would be taken out of the ingress-egress pattern for at least 24 hours, if not longer. This has the potential to at least delay the time when day use controls would have to be seriously considered.

The above discussion is intended to point out the relative impact of this alternative on future day use levels and is not an initiation of day use control considerations. Development of such proposals would be premature until the actual development of outside the park facilities occurs and the patterns of use from these facilities is better known.

Park Operations. Park operations and support services would continue as present. The NPS employees occupying the 10 log cabins adjacent to the North Rim Inn would continue to do so until replacement housing is available at some future date. Concession employees would continue to vacate the adjoining frame cabins. Both NPS and concession employees would share the already overtaxed food services with park visitors. Control of traffic circulation would continue to be a problem and would become increasingly so with the influx of additional day use visitors. This would be especially acute at the Grand Canyon Lodge and, to a lesser degree, at the North Rim Inn.

Visitor information and registration services and interpretive activities would continue to have space limitations at the Lodge. The campground, in its present design, would continue to have operational inefficiencies including lack of visitor contact and random mix of tent and RV campers. Both park and concession employee numbers would remain about the same for the short term. There may need to be

future increases in NPS staff to deal with increased day use as it occurs.

Utilities.

Water System: The existing water system, with little modification except for routine repairs and maintenance, will continue to supply existing visitor and employee needs at the historic rates (peak month use of 103,821 gallons per day or 72 gallons per minute based on July, 1987 figures). Over the long term, some increases in demand occasioned by increasing day use, both due to and independent of new visitor accommodations on adjoining national forest lands, may require modifications in the system to increase supply. Although the system can supply existing needs, the improvements described under this section for Alternative 2 would be a prudent investment, even with no planned lodging or camping expansion, in order to ensure efficiency and reliability.

Sewage System: The existing sewage system should continue to handle current use levels and the expected increases in day use, as described above under *Water System*, for the foreseeable future (also, see impact analysis on the sewage system for Alternative 2, following, for description of sewage system modifications to increase capacity should that ever be required).

Electrical System: The electrical system has been recently renovated and upgraded. There would be no impact.

Summary. The current visitor experience at the North Rim will be preserved. Competition for existing lodging and campsites will be keen with the alternative of seeking lodging on existing or new facilities on the adjoining national forest. Users of the outside lodging and camping would be denied the 24 hour experience at the Grand Canyon, being instead "commuters" to the park. Expected normal increases in day use will be compounded by the influx of users of new lodging and camping facilities outside the park. Existing traffic congestion problems, particularly at Grand Canyon Lodge, will worsen. Competition for the limited food services will increase with both concession and park employees sharing with the visitors. The existing sewage and water systems will be able to handle increased

day use loads. However, some renovation of the water system is advisable to improve efficiency and reliability. Potential cumulative impacts are pressure to build more accommodations on the national forest than now planned, and an accelerated need for the park to control day use numbers.

ALTERNATIVE 2 - THE PROPOSAL, NORTH RIM INN LODGE

Impact On The Natural Environment

Wildlife. Approximately 3.6 acres of wildlife habitat would be removed by construction of the two lodge units, the restaurant, associated infrastructure, parking areas and the campground expansion unit. If the 80 unit lodge were used, habitat loss would be reduced by .2 acre. There would be temporary impacts to wildlife from construction noise, presence of equipment, human trafficking and temporary physical disruption of areas adjoining sites under development. Wildlife will react by being displaced elsewhere with some animals returning with time after construction and others not, due to the presence of the new structures and disturbance. Based on the primitive nature of the remainder of Bright Angel Point outside the developed area and the vast undeveloped areas adjoining, this loss of habitat is considered insignificant.

Vegetation and Soils. The development proposed under this alternative is expected to involve about 3.6 acres of new soil disturbance and the removal of approximately 560 trees consisting of roughly 62% ponderosa pine, 22% aspen and 16% Gambel oak and white fir. The 80 unit lodge variation would reduce this number by about 30 trees. About 8%, or 44 trees, are mature individuals over 24 inches in diameter (usually at least 200 years in age). The tree removal numbers may be reduced somewhat through additional design considerations but this may be offset by inadvertent damage to trees in the bordering areas of construction impact. While there will be revegetation of those areas needing to be temporarily cleared or having potential hazard trees removed to support the development, loss of large trees cannot be mitigated. Use of the two story motel-type structures will minimize the need for having to remove additional hazard trees that may develop in future years. The potential of future hazard trees will be more of a problem in the campground development as tree removal during construction will be minimized to retain as much of the natural setting as possible. There will be

temporary soil disturbance in an area roughly twice the size of the permanently impacted sites due to the need for storage of materials and equipment and the need for equipment maneuvering room during construction.

Threatened and Endangered Species. No known threatened and endangered species, or those proposed for listing, are known to reside in the area proposed for development. This area has been subjected to human impact for the past 60 years. Peregrine falcons nest on cliff faces and potentially could fly by or through the impacted area. However, no impact on their prey base is foreseen.

Water Resources. The proposed development and improvements at the North Rim Inn and the Grand Canyon Lodge vicinity will have no affect on floodplains or wetlands. With respect to the diversion at Roaring Springs Cave, the addition of the new lodge, restaurant, expanded campground, associated increase in concession employees and increase in day use, will require, a 24 gallons per minute (gpm) increase in pumped water capacity to the North Rim (from a 72 gpm present peak month use level to 96 gpm). This will not affect the existing residual flow to Roaring Springs and Bright Angel creeks as the North Rim diversion is tapped off of the static diversion supplying both the North and South rims. The effect of the 24 gpm reduction will be experienced at Indian Springs on the other side of the canyon. The diverted flow to that pumping station is now in excess of needs, and the surplus flow goes into Garden Creek creating a flow above that stream's natural levels. This residual flow is what would be directly affected by the increased use of water at the North Rim (also, see *III. AFFECTED ENVIRONMENT, Socioeconomic Environment, Utilities, Water Supply* preceding in this statement). The impact of the 80 unit lodge on water resources would be identical to that for the 20 cabins described under Alternative 3 following.

Aesthetic Values. The major visual change will occur at the North Rim Inn site where two double story lodging structures and a single story restaurant will be constructed north and west of the North Rim Inn. These buildings would occupy, for the most part, the site previously disturbed by the 30 frame cabins. While an architectural style will be utilized to match the North Rim Inn and screening vegetation will be retained between or adjacent to the structures or planted to the maximum extent practicable, the visual change cannot be mitigated totally. At a future

date, further screening from the existing campground will be possible when the 10 log cabins are removed and that area restored to natural conditions. Alternate use of an 80 unit lodge in two 40 unit structures would not reduce the visual impact significantly.

During the construction period, there will be temporary impacts from equipment movement and materials storage that will expand the impacted area. Any scarred and cleared areas will be restored when the structures are in place and the revegetation efforts are completed.

The new lodge and restaurant would not be visible from within the main Grand Canyon in that they would be located on a side canyon (Transept Canyon) and situated at least 100 feet from the vegetation line along the canyon rim. By comparison, lodging developments on the South Rim and the Grand Canyon Lodge on the North Rim are located very close or on the edge of the main canyon. Lights from the new development will not be visible at night from the South Rim.

The 33 unit expansion of the campground, located north of the existing facility, also will be an intrusion as it would occupy a now undeveloped area. While a buffer strip would be left between the addition and adjoining roads to help provide screening and confine the visual impact to the site proper, a lack of understory vegetation in this area will inhibit the screening potential.

The major positive aesthetic benefits would occur at the Grand Canyon Lodge where vehicle traffic will be removed from the front of the Lodge and replaced with a pedestrian seating area. Also, the parking lots will be redesigned to alleviate congestion and improve appearance. In the North Rim Inn area, the restructuring and segregating of existing campgrounds and removal of parking and traffic flow from the front of the North Rim Inn and relocation of the R.V. dump station and campground registration will benefit the appearance of that structure.

Air Quality. Temporary impacts would occur from fugitive dust generated by construction activities at both North Rim Inn and Grand Canyon Lodge. Over the longer term, in the North Rim Inn area, the additional campsites and the lodging and restaurant facilities could generate smoke from campfires, cooking facilities and heating systems that would pose the potential for air quality degradation under certain

climatic conditions. These episodes are not expected to be significant or long lasting. Also, there would be additional auto and bus exhaust from additional vehicles using the parking lot at the Inn. Overall, these impacts are expected to pose no violation of the class 1 air quality standards for the area. Abatement of the traffic congestion at Grand Canyon Lodge has the potential to improve air quality.

Summary. Approximately 3.6 acres of wildlife habitat and soils will be disturbed and approximately 560 trees will be removed. Revegetation and prudent design will mitigate some of the impact but loss of large trees cannot be mitigated. No new demand will be placed on the Roaring Springs water source as the impact will be realized on the opposite side of the Grand Canyon at Garden Creek, a stream now affected by above-natural flows from unused diverted water. Major visual changes will occur in the North Rim Inn area from introduction of the two-story motel units and the restaurant. These structures will not be visible from the main Grand Canyon. There will be temporary visual impacts during construction. Visual benefits will accrue from traffic improvements at both the Grand Canyon Lodge and North Rim Inn. Most air quality impact will occur on a temporary basis during construction with minor potential for impairment at times from the increased use in the North Rim Inn area and potential for improvement at Grand Canyon Lodge from reduction of congestion. Alternative use of an 80 unit lodge would reduce soil disturbance by .2 acre, tree removal by about 30 trees and have basically the same visual impact.

**Impact On
Cultural
Resources**

Historic Resources. The North Rim Inn and its four adjoining cabins will remain intact with restoration work continuing as provided for in the 1983 Memorandum of Agreement (MOA) with the Arizona State Historic Preservation Officer (SHPO) and Advisory Council on Historic Preservation (ACHP). Otherwise, the historic scene of the North Rim Area will change, primarily from the introduction of the two-story motel units, in place of the single cabins that once were used for visitor lodging, plus the restaurant structure. Removal of the 30 frame cabins, now being vacated as concessioner housing, will be required immediately. The 10 log cabins, occupied by NPS employees, will be removed at a future date when new housing is available.

While the 1983 MOA provided for the removal of the employee cabins, a new MOA would be prudent to reflect

the revised proposal. This would reflect additional mitigation measures required including architectural style and relocation of cabins or reuse of parts in rehabilitation of like structures. At least eight of the frame cabins will be reused in the new concession employee housing area.

Besides change in appearance of the area, there will be a change in historic use in that a greater number of lodgers will mix with campers than has ever occurred. In more recent years, campsites have been the only visitor accommodation in the vicinity of the Inn. The North Rim Inn proper will benefit from the relocation of parking, traffic circulation and the dump site away from the Inn.

The Grand Canyon Lodge will benefit from the elimination of the traffic loop in front of the Lodge and the freeing up of space for appropriate visitor services, particularly interpretation, by elimination of the cafeteria. A single budget cabin will be relocated to allow for the parking and traffic circulation improvements. This action also will be covered by any revision or amendment to the 1983 MOA.

Archeological Resources. The only known archeological site within the North Rim developed area is located remote from any of the proposed new development. All construction activities, however, will be closely monitored to ensure early detection of unknown sites and appropriate avoidance or mitigation will be developed should such an event occur.

Summary. The historical scene, to some degree, will be altered permanently by the new lodging development. The North Rim Inn and adjoining four cabins will be preserved and restored. Both the North Rim Inn and the Grand Canyon Lodge will be enhanced by relocation of parking and alteration of traffic patterns. There will be no impact to archeological resources. There will be a permanent loss of some historic structures (the portions of the 30 frame and 10 log cabins that cannot be reused). Use of the 80 unit lodge variation would have no additional affect, positive or negative, on cultural resources.

**Impact On
Socioeconomic
Environment**

Visitor Use. The traditional visitor experience in the North Rim Inn vicinity will be altered permanently with the introduction of a major lodging facility close to the existing campground and this mix may not meet the approval of some of the users of either type of accommodation. The lodging, combined with the additional 50 campground units

will increase overnight visitor use at the North Rim Inn to a potential maximum of about 400 additional users during peak use periods. Although lodging units and the campground were once mixed, this has not occurred recently and the number of lodging units was small by comparison to the current proposal. The number of lodging units during that period was two campsites for every room. The proposal would change the ratio to 1.3 campsites per room. The re-establishment of the lodging combined with the additional campgrounds units will, to some users (particularly those familiar with the area and who repeatedly visit), be a different experience than that desired.

The above-described impact of the increased lodging and campground development will be offset all or in part by allowing more visitors to experience the changing moods of the Grand Canyon that can only be obtained through a 24 hour stay or longer. Also, the elimination of the need for these new lodgers to have to make singular or daily trips to outside lodging should have the effect of reducing some of the day use congestion, at least over the short term. The new lodging will be designed to provide comfortable accommodations through better weather and pest proofing. In addition, it will allow more flexibility for accommodation of the handicapped and more ease in use by older park visitors who no longer wish to camp or utilize primitive lodging facilities.

Alternative use of an 80 unit lodge facility would have the same effects of those mentioned for the 100 units, from a park visitor standpoint, of the re-establishment of lodging to the North Rim Inn area. On the other hand, loss of 20 units would remove the benefits of visitors staying at the North Rim from about 60 potential visitors per day.

The traffic improvements and restructuring of the existing campground should also serve to alleviate increased congestion caused by the additional uses imposed on the North Rim Inn area. In addition, the proposed development would permit a more even distribution of accommodations between the park and adjoining national forest, thus keeping singular areas from becoming large compounds for accommodating visitors and allowing the national forest facilities to develop as destination resorts in their own right.

The Grand Canyon Lodge area primarily will receive beneficial impacts from this alternative. Traffic congestion will be reduced by the parking and traffic circulation improvements. The development of both lodging and a new restaurant at the North Rim Inn area along with relocation of the accommodation registration will draw some of the existing use away from the Lodge area. The Lodge proper will have more space available for interpretive or other visitor-oriented uses with removal of the cafeteria. The overall appearance will be enhanced with removal of the traffic circle from the front of the Lodge.

There will be disruptions and detractions to visitor use and experience from construction activities. These could last two or more seasons because of the short construction season on the North Rim. These impacts can be offset, in part, by phasing the construction activity to minimize disruptions.

The development of the new lodging and camping facilities will not have the effect of starting a trend of ever increasing visitor facility development of the North Rim. The lodging and camping increases prescribed are considered the limit for the North Rim for overnight use. Consequently, the proposed development is a one time rather than a cumulative impact.

The proposed lodging and camping development and traffic improvements are expected to provide relief to the problems of increasing day use. The 150 additional camping and lodging units translate to that number less vehicles (maximum) requiring daily ingress/egress because of lack of accommodations. Also, the combination of traffic improvements and removal of some of the visitor functions at Grand Canyon Lodge will considerably reduce the congestion that may have accelerated need for day use controls at that historic focal point of North Rim use. In the long run, day use controls may eventually be needed if past trends in increased use continue. Whether they will or not is speculative and the proposed actions under this alternative are expected to at least delay the time day use control measures will be needed.

Park Operations. Current NPS staff is expected to be able to handle any overnight visitation increase; but, there will be an increase in workload. One additional employee would be necessary for operation of the water system (see *Utilities, Water System* following). An estimated additional

50 concession employees would be needed to operate the new lodging and restaurant. Housing for the concession employees is now becoming available at the lower Transept Canyon site. NPS employees will be housed in current facilities with those residing in the 10 log cabins remaining until such time replacement housing is available. When this occurs, it will achieve the desirable goal of separating the bulk of all employee housing from the visitor use areas.

Both concession and NPS employees will benefit from the new restaurant facility in that it will have a separate employee's dining room and the competition with visitors evidenced under current conditions will be eliminated. Other NPS staff will have better control of traffic conditions and use at the Lodge, North Rim Inn and campground.

The new lodging structures, being winterized, will allow for more efficient operation at the beginning and end of the use season and most likely, will be the first opened and last closed. Also, construction materials and methods will allow for long term savings in maintenance and help assure a reasonable supply of lodging units at those times when maintenance closures are necessary at the older lodging units at Grand Canyon Lodge.

Utilities.

Water System: The proposed new visitor development will require additional water usage of 33,835 gallons per day (gpd) for a total of 137,656 gpd peak month demand, an increase of 33% over current demands. This would require increasing the water system pumping capacity to at least 96 gallons per minute. The increased demand estimates are based on a 100 room lodging and 100 seat restaurant addition, 50 additional concession support employees, a 50 unit campground expansion with associated sanitary facilities and allowance for an additional 200 day use visitors independent of the additional campground or lodging users resulting from the expansion. Requirements for an 80 unit lodge are identical to the figures provided for the 20 cabins analyzed under Alternative 3 following.

The provision of the additional required water supply can be accomplished without major reconstruction of the system. The existing pumps will be upgraded from 94 gpm to 102 gpm by increasing the size of the

motor sheave. The transmission line will be cleaned and a low spot corrected to prevent freezing and the necessity for draining. Water loss will be further controlled by installing equipment to transmit pump status and tank level controls through the existing overhead power lines between the North Rim and the pump station. As mentioned under *III. AFFECTED ENVIRONMENT*, much work already has been accomplished to reduce leakage in the distribution system. In addition to the above measures, park staff should be added as backup to ensure operation of the pump station on a continuous basis during the peak season.

The above water use estimates for the proposed development do not account for installation of low water use fixtures or the removal of the existing cafeteria. Consequently, they are "worst case" estimates and actual water use should be lower.

The fire protection water storage requirement will be 250,000 gallons upon completion of the proposed expansion. Current storage of 300,000 gallons of reclaimed water exceeds this requirement and the 50,000 gallons surplus will be available for irrigation of mitigation plantings during the first few years after completion of the project.

The above information on the North Rim water system was obtained from the *North Rim Water System Update, Grand Canyon National Park, May, 1990*, prepared by the Denver Service Center, National Park Service.

Sewage System: The original design of the North Rim wastewater treatment plant was conservative, but does provide some capacity for treatment of additional flow. However, upgrades of specific processes of the existing facility will be required to accommodate additional flows from the proposed development. Current average daily flow is 76,000 gallons per day (gpd). Anticipated flows at the North Rim after construction of the proposed development are estimated to be 101,000 gpd, 119,000 gpd and 150,000 gpd for average, peak month and maximum daily flows respectively. The factors utilized in determining these requirements (lodging and camping units, associated facilities and day use) are identical to

those used in determining increased demand on water. Also, the projections do not account for use of low flow fixtures or the removal of the existing cafeteria. Consequently, they represent a "worst case scenario" and the actual increases should be less. Requirements for an 80 unit lodge are identical for the 20 cabins analyzed under Alternative 3 following.

Modifications to allow for the increased flow from the new development will include on-line equalization restored to its original volume, an increase in aeration basin capacity, rehabilitation of the clarifier and minor changes to the advanced wastewater treatment unit. All of these improvements will be within the footprint of the existing plant and require no expansion into adjoining or other areas of the park. Also, since the proposed new visitor facilities will be essentially the same as those in existence, it is unlikely that influent sewage characteristics will change significantly.

The above information on the North Rim treatment plant was obtained from *Evaluation Of Wastewater Treatment Facilities, North Rim, Grand Canyon National Park, May, 1990*, Denver Service Center, National Park Service.

Electrical System: The North Rim electrical system recently has been renovated and upgraded. It is adequate to meet the expanded needs and should provide additional reliability to the associated utilities. The system is available to the locations of the new facilities and there will be no impact on capacity and/or reliability.

Summary. The current visitor use experience at the North Rim Inn complex will permanently be altered with re-establishment of the lodging. This may result in disapproval by some users of the area, both from the change in the nature of the area and from the additional user congestion. For others, it will be an improvement with convenient lodging, meal and related services. Addition of the new lodging will allow more visitors to experience the environment of the Grand Canyon on a 24 hour basis and should reduce the number of day use trips to the park, at least over the short term. Also, the new lodging would allow provision of comfortable accommodations to a variety of users. In addition, provision of lodging both in the park and national forest allows avoiding concentrations of use

and permits national forest resorts to become a destination in their own right. The Grand Canyon Lodge area benefits by removal of some uses to the North Rim Inn and improvement of traffic circulation and parking. The proposed development has potential to delay possible future controls on day use and does not create a potential cumulative impact in that it establishes a ceiling for visitor accommodations on the North Rim. Although there will be some increase in work load, park operations generally will improve through more separation of employees and visitors for logistic purposes, improvement of traffic circulation, additional space to conduct visitor programs, and increased efficiency and reliability of lodging units. The water and sewer systems, through modifications that do not impact park resources, will be able to handle the increased demands. The electrical system is new and capable of accommodating the development without modification.

Use of the 80 unit lodge variation would not significantly reduce adverse impacts on visitor use but would reduce the beneficial affects. There would be no significant difference on park operation impacts and the water and sewage requirements would be identical to those for the 20 cabins analyzed under Alternative 3.

ALTERNATIVE 3 - NORTH RIM INN CABINS

Impact On The Natural Environment

Wildlife. As compared to Alternative 2, approximately 3.2 acres of wildlife habitat would be removed under this plan. The difference is due to the fact that 20 fourplex units, a combination registration/linen storage facility and a small linen storage building would be utilized instead of the two motel units. Other development would be identical to Alternative 2. If 25 fourplex cabins were used, in order to achieve the same 100 units as the lodge proposal, an additional .2 acre of habitat would be lost for a total of 3.4 acres. Temporary construction impacts will be the same as under Alternative 2. Temporarily displaced wildlife populations may return, in part, to the affected area after construction is completed with the number potentially higher than Alternative 2 as deer and other wildlife can graze or colonize in the areas remaining between the cabins. Like Alternative 2, the overall loss of wildlife habitat is considered insignificant.

Vegetation and Soils. The development proposed under this alternative is expected to involve about 3.2 acres of soil disturbance and the removal of approximately 600 trees consisting of 57% ponderosa pine, 25% aspen and 18% Gambel oak and white fir. The number of mature trees over 24 inches in diameter is about the same as under Alternative 2. Tree removal numbers may be reduced through further design refinements and the opportunity to "landscape in" the individual cabins versus the inflexibility of the motel type units. If the 25 cabin variation is used, soil disturbance would be increased by about .2 acre and about 13 additional trees would have to be removed. In actuality, the development perimeter of this alternative, with either 20 or 25 cabins, is greater in area than that of Alternative 2 because of the more dispersed nature of the cabins and restaurant complex. Like Alternative 2, there will be temporary disturbance, from construction activities, of an area roughly twice the size of the permanently impacted sites. This will be revegetated and recontoured as required. However, loss of large older trees from construction activities cannot be fully mitigated. Also, the dispersed cabins pose a higher potential for the need to remove additional hazard trees over the long term than the motel type accommodation units.

Threatened and Endangered Species. Identical to Alternative 2, there would be no impact on threatened and endangered species.

Water Resources. The proposed development under this alternative will have no impact on floodplains and wetlands. The impact on the water source at Roaring Springs would be identical to Alternative 2 except that the reduction of 20 lodging units would reduce the demand by approximately 2500 gallons per day (gpd) and the diversion rate by approximately 2 gallons per minute (gpm). Thus, the diversion rate would be increased by 22 gpm over the current diversion to about 94 gpm. This is not considered a significant difference from Alternative 2. The 25 cabin variation would be identical to Alternative 2 with respect to water usage.

Aesthetic Values. With the utilization of cabins for the new lodging, in lieu of the two double story units as proposed under Alternative 2, the visual impact will be reduced from a vertical standpoint but increased somewhat in the horizontal plain as the cabins and restaurant will occupy a larger ground area. Because of the ability to "landscape in" single

story structures, vegetative screening will be more effective. However, the buffer area between the new accommodations and the campground area will be reduced. Additional walkways will be required to connect the detached units but, through proper design and use of natural materials, these should not create a significant additional visual impact. Use of the 25 cabin variation would extend the impact area further northward in order to avoid development in close proximity to the canyon rim.

Like the structures proposed under Alternative 2, the cabins and restaurant proposed under this alternative will be located at least 100 feet back from the rim of Transept Canyon. Therefore, the proposed structures under this development plan also will not be visible from the main Grand Canyon at any time or from the South Rim at night from artificial lighting.

The visual impacts of the campground expansion will be identical to those described under Alternative 2. Also, the beneficial impacts to the Grand Canyon Lodge and North Rim Inn areas from the traffic improvements will be identical to those stated for Alternative 2.

Air Quality. The impacts are identical to Alternative 2, those being temporary from construction activities and potential long term from additional smoke generated from campfires, heating units, etc. Air quality standards will be maintained. The potential to improve air quality from relief of traffic congestion is the same.

Summary. Approximately 3.2 acres of wildlife habitat and soils will be disturbed and about 600 trees will have to be removed. The disturbed acreage is smaller than under Alternative 2 because of the ability to "landscape in" the fourplex cabins. The proposed development actually would partially impact a greater area because of its dispersed nature. Revegetation and design will reduce tree losses but the loss of large trees cannot be mitigated. As compared to Alternative 2, visual impacts will be reduced through the use of single story cabins. Otherwise, positive and negative visual benefits would be identical. Impacts on water resources and air quality would be identical to Alternative 2. Use of the 25 cabin variation would increase soil and wildlife habitat disturbance by .2 acres and require the removal of about 13 additional trees. The development footprint would be extended further northward to avoid construction on the canyon rim.

**Impact On
Cultural
Resources**

Historic Resources. This alternative is identical to Alternative 2 in that the North Rim Inn and four adjoining cabins will be retained and restored in accordance with the 1983 MOA and the 30 frame and 10 log cabins will be slated for removal and either be relocated in total or parts reused in restoring other like structures. A major difference would be in the removal scenario in that the 10 log cabins would need to be removed at project inception rather than at a later date when new NPS housing would be available. The space occupied by these cabins is needed for the restaurant because of the additional area occupied by the individual cabins. Like under Alternative 2, a new MOA would be prudent in order to reflect the revisions since the original development plan for the area. Also, as in Alternative 2, eight of the frame cabins will be reused in the concession housing area.

Use of the area would change, as under Alternative 2, through the introduction of a sizeable lodging complex into what has been an area predominately used for camping and employee housing in recent years. However, the use of detached cabins in lieu of the two story motel complexes would be more in keeping with the nature of the former lodging structures (the existing 30 frame and 10 log cabins to be removed).

The affect on the Grand Canyon Lodge and its immediate environs would be identical to that described under Alternative 2. Restructuring of the traffic patterns and parking and the availability of space in the Lodge from removal of the cafeteria would have a positive effect on the historic environment of the Lodge. The same can be said for the North Rim Inn proper with the restructuring of parking and relocation of other support facilities away from the Inn.

Archeological Resources. Impacts would be identical to Alternative 2 with no affect on known resources. Construction would be monitored for unknown resources.

Summary. While the historic scene and use of the North Rim Inn will be altered permanently by introduction of the lodging units and restaurant, the detached cabins will reflect the type of lodging structures that were used in this area. All of the frame and log cabins located north and west of the Inn will have to be removed immediately to allow for this lodging and restaurant plan. To the extent that these

cabins cannot be relocated and reused in total, or in parts, there will be a permanent loss of historic structures. The use of the 25 cabin variation will have no additional impact, either positive or negative. Benefits to the Grand Canyon Lodge and North Rim Inn historic district from the traffic improvements will be identical to Alternative 2. There will be no impact on archeological resources.

**Impact On
Socioeconomic
Environment**

Visitor Use. The impact on the current visitor use of the North Rim Inn area will be essentially the same as that described under Alternative 2 except the increase in overnight users will be smaller (about 60 less) and the use of cabins will more reflect the traditional rustic accommodations as compared to the two story lodging units. The potential to relieve some of the day use congestion, both short and long term, is reduced by the elimination of 20 lodging units from the numbers proposed under Alternative 2. The number of lodging units still remains high enough to achieve a balance with accommodations planned on the national forest. However, since lodging appears to be in shorter supply than existing and projected future camping opportunities in the area, there is some potential to create future pressure to make up the difference at either Kaibab Lodge or Jacob Lake. Like Alternative 2, adoption of this alternative would establish the ceiling for overnight accommodations at the North Rim. Use of the 25 cabin variation would bring this plan into parity with the 100 unit lodge alternative with respect to the potential benefits of additional lodging.

The accommodations may be more pleasing to some users because of the privacy of fourplex cabins versus the larger motel units proposed under Alternative 2. On the other hand, some flexibility to accommodate handicapped users and the ease of use by more elderly populations will be lost in that the detached units will create greater walking distances to parking and other support facilities. This also can create potential hazards to all users, particularly at night.

Beneficial impacts to the visitor experience at Grand Canyon Lodge would be identical to those identified for Alternative 2, and would stem from the traffic improvements, drawing of use to the North Rim Inn area and the additional space that would be made available in the Lodge from removal of the cafeteria.

The effect of this alternative on day use patterns over the long term and the need for day use controls is similar to that stated for Alternative 2 except for the reduction in numbers of visitors that can be accommodated in the park and removed from the ingress/egress cycle. Again, use of 25 cabins would create an impact identical to Alternative 2.

Park Operations. One of the major differences in impacts to park operations, as compared to Alternative 2, is that in order to accommodate the new restaurant, the 10 log cabins used for NPS housing and located adjacent to the North Rim Inn will need to be removed immediately. Consequentially, replacement housing must be provided in the existing NPS housing area at the early stages of the project. Another difference is that the detached cabin plan will cause some increased costs in maintenance and operating efficiency as compared to the lodging units proposed under Alternative 2. For example, there will be walkways to maintain along with individual utility hookups and a loss of heating efficiency, even though the units will be winterized. Otherwise, the park and concession staff requirements and the benefits of separate employee services, reduced traffic congestion and ability to conduct more visitor programs at the Lodge are the same as under Alternative 2.

Utilities.

Water System: The proposed new visitor development will require additional water usage of approximately 30,485 gallons per day (gpd) for a total of approximately 134,306 gpd, an increase of about 29% over current peak month demands. Pumping capacity would have to be increased to at least 93 gallons per minute. The increased demand is based on the same factors used for Alternative 2 except that there are 20 less overnight lodging units. The provision of the additional required water supply would be accomplished exactly as described under Alternative 2. Some additional water lines to those required for Alternative 2 would be needed because of the detached cabins versus the more concentrated lodge. The fire protection water storage system is more than adequate to handle this development. The 25 cabin variation would require the same water supply increase as for the 100 unit lodge under Alternative 2.

Sewage System: As compared to Alternative 2, the reduction of 20 overnight lodging units produces a small reduction in the predicted sewage flows. Estimated average daily, peak month and maximum daily flows would equal approximately 98,750, 116,500 and 148,000 gallons per day respectively. The 25 cabin variation would produce identical flows to those of the 100 unit lodge under Alternative 2. Consequently, the same sewage treatment plant modifications to increase capacity, as prescribed under Alternative 2, would be required for this alternative. Like the water system, some additional collection lines to those required for Alternative 2 would be needed because of the detached cabins versus the more concentrated lodge.

Electrical System: Like Alternative 2, the newly renovated and upgraded electrical system is adequate to meet the demands of this development option with no significant impact on capacity and/or reliability.

Summary. Similar to Alternative 2, the current visitor use experience at the North Rim Inn area will be altered with the introduction of the new lodging. However, the use of detached cabins is more in keeping with the nature of the prior limited lodging. The benefits of reducing congestion and achieving a balance with accommodation plans on the national forest are reduced from those of Alternative 2. Similarly affected is the potential to delay possible future implementation of day use controls. Use of the 25 cabin variation would make these factors identical to Alternative 2. Benefits to Grand Canyon Lodge are identical to those stated for Alternative 2. The demand on the water, sewer systems is slightly less compared to Alternative 2, but identical if 25 cabins are used. NPS employee housing in the North Rim Inn area must be relocated immediately under this alternative and there will be increased maintenance costs and loss of efficiency in utilizing the detached cabins versus the motel type units proposed under Alternative 2. There would be further cost increases and loss of efficiency if the 25 cabins were used.

ALTERNATIVE 4 - CAMPGROUND EXPANSION ONLY

Impact On The Natural Environment

Wildlife. Implementation of this alternative would result in removal of approximately 1.6 acres of wildlife habitat through the construction of 80 camping units on two new sites and refurbishing existing sites. There would be temporary dislocation during the construction period but some wildlife populations would return afterward to utilize the areas between the campsites. Based on the natural condition of the bulk of Bright Angel Point and the vast undeveloped areas adjoining, this loss of wildlife habitat is considered insignificant.

Vegetation and Soils. The campground expansion and refurbishing will require approximately 1.6 acres of soil disturbance and the removal of 467 trees comprised of 66% ponderosa pine, 19% aspen and 15% Gambel oak and white fir. The tree removal numbers have the potential to be reduced and the cutting of mature trees avoided through careful design and planning of campsites. However, over the long term, hazard tree situations will develop that will require additional removal, and the loss of mature trees under these circumstances will be more likely. The smaller amount of construction materials needed and the flexibility afforded by the more simple campsite installation should keep the temporarily disturbed area to a minimum under this alternative.

Threatened and Endangered Species. Identical to Alternative 2 and 3, there are no anticipated impacts to threatened and endangered species.

Water Resources. The proposed campground expansion would not affect any floodplains or wetlands. The 80 unit expansion of the existing campground will require an increase of 10 gallons per minute (gpm), in the average pumping rate, to 82 gpm as compared to the present 72 gpm. As described under Alternative 2, any increases in the pumping rate will have no effect on the residual flows to Roaring Springs and Bright Angel creeks. The only effect is on the surplus amount at Indian Gardens that may spill into Garden Creek.

Aesthetic Values. With no new lodging development at the North Rim Inn, there would be much less change in the physical appearance of the area. The two campground expansion areas would intrude on previously undeveloped or partially developed areas. While buffer strips will be left between existing roads and both expansions, lack of understory in the area will preclude total screening.

The immediate vicinity of the North Rim Inn would be enhanced visually by the traffic improvements and relocation of the dump station. Eventually, the 10 log cabins utilized for NPS housing would be removed and the North Rim Inn and four adjoining cabins plus the service station would be the only sizeable structures remaining in the vicinity of the campgrounds.

Aesthetic impacts to the Grand Canyon Lodge area primarily would be beneficial but not to the degree described under Alternatives 2 and 3. The major difference would be the visual impact of additional congestion for lodging registration, use of the restaurant because of the limited food service at the North Rim Inn, and additional overall day use by visitors lodged outside the park. Otherwise, the other benefits of traffic improvements and Lodge use changes described for Alternatives 2 and 3 would occur.

There would be some temporary visual impacts from scarring and construction equipment while the improvements are underway.

Air Quality. There would be temporary impacts during campground and traffic improvements construction from fugitive dust. Over the longer term, the users of the additional 80 campground units would generate campfire smoke, fumes from portable generators, etc. that may degrade air quality for short periods under certain atmospheric conditions. This is not expected to be a significant impact and air quality standards will be maintained.

Summary. Approximately 1.6 acres of wildlife habitat and soils will be disturbed and about 467 trees will have to be removed. The impact on water resources will be identical to that of Alternative 2 except that the diversion from the cross-canyon pipeline will be smaller. The visual appearance of the North Rim Inn area will be only slightly altered with the impact confined to the removal of cabins

formerly used for housing and the introduction of two new camping areas. Temporary visual and air quality impacts will occur from construction. The increase in number of campers could have a minor long term affect on air quality.

**Impact On
Cultural
Resources**

Historic Resources. The historic scene and use would be preserved except the 30 frame cabins must be removed to allow for the campground expansion. The 10 log cabins used for NPS housing will be removed at a later date when replacement housing is available. The traffic improvement benefits to the Inn and Lodge areas would be identical to Alternatives 2 and 3. The possible use of a portion of the North Rim Inn, now used as an employees' lounge, for snack food service will be considered. This and the removal of cabins will be addressed in a new MOA, with the State Historic Preservation Officer and Advisory Council on Historic Preservation, as described under Alternatives 2 and 3. Reuse of the removed cabins will be as described under Alternatives 2 and 3.

Archeological Resources. There will be no impact on known archeological resources. Construction activities will be monitored for unknown resources.

Summary. The historic scene and use will be maintained except for removal of cabins formerly used for employee housing. There may be a change in use of part of the Inn by adding a snack food service within the existing building. Cabins relocation and use will be as described for Alternatives 2 and 3. Traffic improvements will benefit both the Lodge and Inn. There will be no impact on archeological resources.

**Impact On
Socioeconomic
Environment**

Visitor Use. The recent use pattern of the North Rim Inn area would be preserved by catering only to campers with the lodging use confined to the Grand Canyon Lodge Area. While the campground expansion will be a boon to camping enthusiasts, potential overnight visitors who prefer not or are unable to camp would not benefit from this alternative. The potential to relieve some of the day use congestion is considerably reduced as compared to Alternatives 2 and 3. Considering the existing and proposed camping opportunities on the adjoining national forest, available lodging on both the forest and in the park appears to have the greatest shortfall. Also, the camping expansion alone is not likely to benefit tour groups.

Compared to existing conditions, campers using the expanded facilities after completion will find a more congested atmosphere. There is the potential of approximately 240 additional overnight campground users during peak periods. Restricted campsites, relocated facilities and an improved visitor contact system will mitigate this impact to some degree. However, the lack of a new full service restaurant, with a snack service as a substitute at the North Rim Inn, will create congestion and delays in service at mealtimes. Although closure of the cafeteria at the Lodge is planned to allow other visitor oriented use of the space, the closure may prove not to be practical.

There will be temporary disruptions in the campground area during construction. The benefits of the traffic improvements to the Lodge and Inn areas would be identical to Alternatives 2 and 3. Depending on the future of the cafeteria operation at the Lodge, there is a potential to retain some of the existing congestion in the Lodge area.

The potential for the need to establish future day use controls is greater under this alternative than for Alternatives 2 and 3. Also, the pressure to further expand lodging on the national forest and the potential for having those facilities dominated by park users is increased under this alternative.

Park Operations. Park employee increases under this alternative are the same as for Alternatives 2 and 3, while concession employees would remain at existing levels. Future increases in park employees may be needed as day use levels increase. The improved structuring of the campground should ease administration. Like the no action alternative, park and concession employees would have to compete with the visitors for food services. Similar to Alternative 2, the NPS employees would be able to continue residing in the 10 log cabins adjacent to the North Rim Inn until replacement housing becomes available.

Utilities.

Water System: The proposed campground expansion will require additional water usage of 13,936 gallons per day (gpd) for a total of approximately 117,757 gpd, an increase of about 13% over current peak month levels. This is based on expansion of the campground by 80 units and an allowance of an additional 200 day use visitors independent of the campground users. While

this would not tax the existing system to the degree that Alternatives 2 and 3 would, it is considered prudent to complete the improvements, as described under Alternative 2, in order to improve efficiency and reliability. Also, the above-stated increased day use allowance may prove low if new lodging and campground development outside the park generate higher levels of day use. The existing fire protection water system is more than adequate to accommodate the campground expansion.

Sewage System: The campground expansion and allowance for increased day use would cause estimated average daily, peak month and maximum daily flows to increase to approximately 86,000, 101,000 and 129,000 gallons per day respectively. While this would be a more modest increase, as compared to Alternatives 2 and 3, and may be within existing capacity, some of the modifications described under Alternative 2 may be prudent to ensure system reliability and allow for unforeseen increases in day use or other contingencies. Consequently, some modification of the system is assumed under this alternative.

Electrical System: The newly renovated and updated electrical system is adequate to accommodate the campground expansion with no affect on capacity or reliability.

Summary. The current use pattern at the North Rim Inn would continue with an increase in the number of campers. Persons preferring not or unable to camp would not benefit from this plan. Food services would remain limited and this may compromise removing some of the congestion from the Grand Canyon Lodge area. The overall opportunity to reduce or control some of the day use through additional overnight accommodations would be lessened. NPS employees may increase slightly over the long term while concession employees would remain static. Both would have to compete for food services with the visitors. Water system demands would be less than under Alternatives 2 and 3 but the same improvements to the system would be prudent. Sewage system improvements also would be needed but to a lesser extent than Alternatives 2 and 3.

ALTERNATIVE 5 - TRAFFIC IMPROVEMENTS ONLY

Impact On The Natural Environment

Wildlife. Other than the loss of some trees (see *Vegetation and Soils* following) there will be no significant loss of habitat. The affect of current and potential increased future visitor use to the area would be identical to no action - Alternative 1.

Vegetation and Soils. A negligible amount of soil disturbance would occur (about 0.1 acre). Approximately 119 trees, consisting of 56% ponderosa pine, 7% aspen and 37% Gambel oak and white fir, would need to be removed through the redesign and movement of existing traffic medians. Removal of mature trees would be avoided. The traffic improvements and restructuring of the campground should help prevent some of the potential impacts of both present and increased future use as discussed under Alternative 1. Temporarily disturbed area during construction should be at a minimum.

Threatened and Endangered Species. Identical to all other alternatives, there will be no impact to threatened and endangered species.

Water Resources. The proposed traffic improvements will not impact any floodplains or wetlands. Impacts on the water supply are identical to those stated for Alternative 1 (no action).

Aesthetic Values. Identical to Alternative 1, no new visual intrusions will occur and the overall ambiance of the North Rim developed area will not change. The proposed traffic improvements should enhance the visual qualities of both the Lodge and Inn areas through the removal of congestion, at least over the short term. Longer term degradation of visual qualities could occur if day use levels continue to increase at past rates. The employee frame and log cabins at the Inn area will remain for the short term providing either a rustic atmosphere or an eyesore, depending on perceptions.

Air Quality. There may be some improvement in air quality through the removal of congestion, at least over the short term. There will be minor impact from fugitive dust during traffic improvement construction. Increased levels in day use, from overnight facilities outside the park, could lead to

longer term degradation, but remain within current air quality standards.

Summary. There will be negligible loss of wildlife habitat and soil disturbance. About 119 trees will need to be removed to allow for traffic median redesign. Overall, short term visual impacts will be minimal with some improvement through removal of congestion at Grand Canyon Lodge and the North Rim Inn. Congestion may return if day use increases at past rates and no controls are instituted. The same is true for air quality, short term improvement with potential for long term degradation.

**Impact On
Cultural
Resources**

Historic Resources. The impacts will be identical to Alternative 1, no action, except that the historic scene at both the Grand Canyon Lodge and North Rim Inn will be enhanced by traffic improvements. The existing employee lounge at the North Rim Inn will be considered for conversion to a snack food service.

Archeological Resources. There will be no impact on known archeological resources. Traffic improvement construction activities will be monitored for potential unknown archeological resources.

Summary. Some positive impacts will accrue to both historic districts from the traffic improvements. No impact on known archeological resources.

**Impact On
Socioeconomic
Environment**

Visitor Use. With no new lodging or camping accommodations proposed under this alternative, the impacts would be virtually identical to those under no action, Alternative 1, both from the standpoint of visitation to the park and the affect on visitor accommodations on the adjoining national forest. The traffic improvements will relieve some of the existing congestion and enhance the visitor experience over the short term. However, without new overnight accommodations to reduce some of the day use traffic, the potential for future need to exercise day use controls is higher than for Alternatives 2, 3 and 4. Like Alternative 4, which provides for campground expansion only, a snack service would be considered for the North Rim Inn. This may not provide enough food service relief to alleviate crowding at the Lodge facilities and may render the phasing out of the cafeteria impractical. The restructuring of the campground will provide some positive benefits to users from better visitor contact by park staff and separation of the tent and RV campers.

Park Operations. Impact on park operations would be identical to those of Alternative 1 except that there will be better controls on traffic circulation. Staff demands for both the park and concessioner will remain about the same. The competition for food service will continue to be a problem for both concession and park employees. Visitor registration for lodging accommodations would remain at the Lodge, thus removing some of the congestion relief benefit of the traffic improvements.

Utilities. Impacts on the water, sewage and electrical systems are identical to those stated for Alternative 1 (no action).

Summary. Impacts on visitor services and park operations would be identical to those of Alternative 1 except for the benefit in relief of congestion that would be realized from the traffic improvements. Impact on utilities would be identical to Alternative 1.

UNAVOIDABLE ADVERSE IMPACTS

The implementation of Alternatives 2, 3 or 4 will permanently change the nature of the North Rim Inn Historic District by requiring the removal of the frame cabins formerly used and log cabins currently used for employee housing in order to implement the proposed development plans. Implementation of Alternatives 2 or 3 would further modify the area through the construction of new lodging structures within the historic district and by introducing overnight visitor lodging in an area that has not accommodated that use in the recent past. Also, the increase in overnight visitors will alter the existing leisure pace of the area to some extent.

The area occupied by the development proposed under Alternatives 2, 3 and 4 would be permanently lost as natural habitat and the larger trees requiring removal cannot effectively be replaced in kind.

CUMULATIVE EFFECTS

Construction of new overnight lodging, as prescribed under Alternatives 2 and 3, will attract an increased number of longer term users to the North Rim and, in combination with the proposed new lodging facilities planned on the national forest, may increase awareness and overall use levels of the area. This could lead to pressure to expand lodging and extend the season of use for both the forest and park.

The proposed park lodging is considered a ceiling on overnight use and would not result in a never ending scenario of additional development. Further, the park development is not now capable of or planned for utilization in the winter. Therefore, pressures to expand both the number of lodging units and extend the season to winter use would fall upon the national forest resources or other facilities outside the park to accommodate such demand.

Expansion of camping only, as provided under Alternative 4, would increase use levels but not to the extent of the combination with lodging as under Alternatives 2 and 3. With the expansion of formal campgrounds proposed on the national forest plus the fact that camping is allowed on unimproved sites on the forest, the additional camping allowed in the park is more of a convenience than an attraction to large numbers of new users. Also, it does not lend itself to creating a demand for significant winter use.

Under Alternatives 1 and 5, the elimination of any additional accommodations, combined with the proposed accommodation increases on the national forest, would create a high potential of increased day use visitation to the park from those using the national forest accommodations. While day use levels could be expected to increase in any event, a more rapid increase could be expected under these alternatives and the time when use controls would have to be considered and/or implemented could occur sooner than if some of the day use traffic is eliminated by increased accommodations in the park. Also, the static level of lodging in the park could affect the ability of the national forest lodging centers from developing as destination resorts in their own right and increase the pressure to develop accommodations beyond the planned level on the national forest to satisfy the existing shortfall. In view of the highly scenic and primitive nature of the

corridor leading to the park, the potential development of one or more concentrated visitor service areas may be less desirable than providing a balance between the park and national forest in visitor accommodations.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES AND SHORT TERM USE VERSUS LONG TERM PRODUCTIVITY

While most developed areas can be restored over time to original conditions, the use of land and financial resources to effect the proposed development under Alternatives 2, 3 and 4 would be, in a practical sense, irreversible and irretrievable commitments of resources. The commitment would be greater under Alternatives 2 and 3 than under Alternative 4, which is confined to campground development only. Also, the development under all three of the alternatives is centered in existing developed areas so that the new land committed to development is minimized. An additional irreversible and irretrievable commitment of the three development alternatives is the alteration of the North Rim Historic District. There would be no irreversible or irretrievable commitment of this resource under Alternatives 1 and 5.

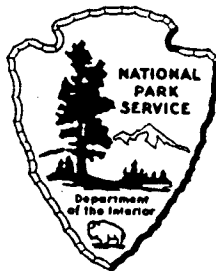
Over the short term, the implementation of Alternatives 2, 3 or 4, will disrupt visitor services, some historic features and a small portion of the natural environment during construction of the proposed development. Also, the influx of the additional overnight visitors and the mix of campers and lodgers will change the ambiance of the area for a time until users become accustomed to the change. Over the long term, more visitors will be able to experience the North Rim over longer periods without having to make daily trips from lodging elsewhere. This has the potential to avoid or delay the time when day use controls might have to be implemented. The most important components of the historic district, the Inn and adjoining four cabins, will remain. Also, the new development will be designed to blend with the historic structures and surroundings and the intrusion into previously undeveloped area will be minimized. Therefore, the area should regain a relaxed atmosphere in a natural surrounding. This will be maintained through the cap on future overnight use that would be implemented by adoption of any of the development alternatives.

Under Alternatives 1 and 5, the short term affect would be negligible. The historic district would remain intact and overnight visitation would remain static. Over the long term, day use from accommodations outside the park would increase, adding congestion and increasing competition for the limited visitor services. There would be some loss of the relaxed pace now experienced and some form of day use control may become necessary. Also, the historic district may change as the frame and log cabins used for employee housing become vacant and their on-site utility expires.

CONSULTATION

AND

COORDINATION



V. CONSULTATION AND COORDINATION

DIRECT CONSULTATION

The Notice of Intent for the preparation of this supplemental environmental impact statement was published in the *Federal Register* of September 1, 1989. Since an environmental assessment presenting the proposal contained in this document had been circulated to the public in March, 1988, and 53 letters of comment had been received at that time, no formal public scoping sessions were conducted. However, a 30-day comment period was held open for receipt of comments on the preparation of this document and several were received. The bulk of these expressed opinion on the proposed action but presented no new issues for analysis. Therefore, the refinements in the alternatives and analysis presented in this document are based primarily on responses to the 1988 Development Concept Plan/ Environmental Assessment and meetings or other direct contact with the following parties.

U.S. Forest Service, Kaibab National Forest
(Cooperating Agency)

Arizona State Historic Preservation Officer

National Parks and Conservation Association,
Southwest Region

Grand Canyon Trust

Sierra Club

U.S. Fish and Wildlife Service, Ecological Services,
Phoenix, AZ

TW Recreation Services, Inc.

National Park Service,
Staffs of Grand Canyon National Park, Denver Service
Center, Washington Office and Western Regional Office

DISTRIBUTION OF THE DRAFT SUPPLEMENTAL ENVIRONMENTAL STATEMENT FOR PUBLIC AND AGENCY REVIEW

Arizona Congressional Delegation

Utah Congressional Delegation

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture, Forest Service, Kaibab
National Forest
Department of the Interior
 Fish and Wildlife Service
 Geological Survey
 Bureau of Land Management
 Bureau of Mines
 Bureau of Indian Affairs
Environmental Protection Agency

Arizona State Agencies

Arizona State Clearinghouse
Arizona State Historic Preservation Officer

Utah State Agencies

Office of Planning and Budget

Local Governments

Coconino County, AZ
Kane County, UT
City of Fredonia, AZ
City of Kanab, UT

Organizations and Businesses

Grand Canyon Trust
National Audubon Society
National Parks and Conservation Association
National Parks Foundation
National Wildlife Federation
Sierra Club (national hdqs. and local chapters)
Sierra Club Legal Defense Fund, Inc.
TW Recreation Services, Inc.
Wilderness Society

Information copies of the draft supplemental statement also are sent to local libraries and libraries in Phoenix, Arizona, Salt Lake City, Utah, and Las Vegas, Nevada; federal depository libraries; individuals on the park's mailing list; those that responded with scoping comments; local businesses and tour operators.

APPENDICES



APPENDIX A

CONSTRUCTION COST ESTIMATES BY ALTERNATIVE

COST BY ALTERNATIVE (IN THOUSANDS)

COST ITEM	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5
North Rim Inn Area					
Removal/relocation 30 concessioner frame employee housing cabins (remove 22, relocate 8)	(a)	118	118	118	(a)
Relocate 10 NPS log cabin residences		(a)	50	(a)	
Construct 100 unit lodge plus restaurant including furnishings, and infrastructure		4205(c)			
Alternate 80 unit lodge		3218(c)			
Construct 20 fourplex lodging cabins, restaurant, and combination registration/ linen storage and separate linen storage buildings			3565(c)		
Alternate of 25 fourplex cabins			4196(c)		
Redesign of existing campground & group camp, construction of kiosk, registration station relocate laundry/shower and dump station		435	435	435	210(b)

COST ITEM	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5
<i>North Rim Inn Area (Continued)</i>					
33 unit campground expansion including comfort stations, utilities, roads and restoration	330	330	330	330	
Construct additional 35 unit campground including 2 comfort station additional kiosk, utilities roads and restoration				350	
Rehabilitate North Rim Inn and adjoining four cabins	400	400	400	400	400
Convert North Rim Inn employees lounge to snack food service facility				120	120
<i>Grand Canyon Lodge Area</i>					
Demolition of roads/parking lots to be relocated and removal/relocation of one budget cabin	100	100	100	100	100
Construction of relocated roads, parking and pedestrian seating area/walkway	900	900	900	900	900
Utilities associated with above	297	297	297	297	297

COST ITEM	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5
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NPS Headquarters/Housing Area

Replacement housing for 10 NPS cabins		(a)	750	(a)	
Relocate entrance, admin. building and housing adjacent to sewage plant in conjunction with above		(a)	600	(a)	

Water & Sewer Systems

Upgrade water system	661(a)	661	661	661	661(a)
Upgrade sewage system		284(c)	284(c)	284	

Footnotes

- (a) Desireable addition
- (b) Excludes increasing size of campground and relocation of laundry/shower and dump station
- (c) Costs to be borne by concessioner

APPENDIX B

SHPO/ACHP/NPS 1983 MEMORANDUM OF AGREEMENT

**Advisory
Council On
Historic
Preservation**

APPENDIX B

1522 K Street, NW
Washington, DC 20005

JAN 19 1983

Mr. Howard H. Chapman
Regional Director
Western Regional Office
National Park Service
450 Golden Gate Avenue, Box 36063
San Francisco, CA 94102

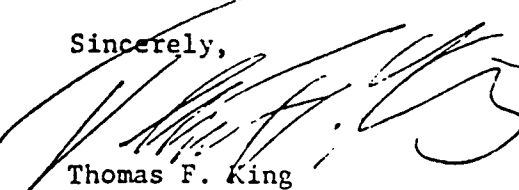
Dear Mr. Chapman:

The Memorandum of Agreement for the Comprehensive Design Plan, North Rim, Grand Canyon National Park, Arizona, affecting North Rim Headquarters, North Rim Inn and Campground and the Grand Canyon Lodge Historic Districts, has been ratified by the Chairman of the Council. This document constitutes the comments of the Council required by Section 106 of the National Historic Preservation Act and Section 2(b) of Executive Order 11593, "Protection and Enhancement of the Cultural Environment", and completes compliance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 8J0). A copy of the Agreement is enclosed.

In accordance with Section 800.6(c)(2) and 800.9(3) of the regulations, a copy of this Memorandum of Agreement should be included in any environmental assessment or statement prepared for this undertaking to meet requirements of the National Environmental Policy Act and should be retained in your records as evidence of compliance with Section 106 of the National Historic Preservation Act and Section 2(b) of Executive Order 11593.

The Council appreciates your cooperation in reaching a satisfactory resolution of this matter.

Sincerely,



Thomas F. King
Director, Office of Cultural
Resource Preservation

Enclosure

MEMORANDUM OF AGREEMENT

Comprehensive Design Plan

North Rim
Grand Canyon National Park
Arizona

WHEREAS, the National Park Service has determined that the Comprehensive Design Plan, North Rim, Grand Canyon National Park, Arizona will have an effect upon properties included in or eligible for inclusion in the National Register of Historic Places and has requested the comments of the Advisory Council on Historic Preservation pursuant to Section 106 (and Section 110f) of the National Historic Preservation Act (16 U.S.C. 470) and its implementing regulations, "Protection of Historic and Cultural Properties (36 CFR Part 800),"

NOW, THEREFORE, the National Park Service, the Arizona Historic Preservation Officer, and the Advisory Council on Historic Preservation agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

The National Park Service will ensure that the following measures are carried out:

A. General Provisions

1. The boundaries of all historic districts on the North Rim will be shown on appropriate maps included in the forthcoming Comprehensive Design Plan, North Rim Development, Grand Canyon National Park, Arizona (hereafter referred to as "Plan")
2. Prior to alteration or demolition of structures within the historic districts, they will be recorded for inclusion in the Historic American Building Survey.
3. Rehabilitation or restoration of all National Register listed or eligible property will be done in accordance with the Secretary's Standards for Historic Preservation Projects, NPS-28 and applicable NPS policy and management manuals and the forthcoming Plan.
4. Prior to advertising for construction or demolition bids, final plans and specifications for development affecting historic districts or their individual structures will be submitted to the Arizona State Historic Preservation Officer (SHPO) for review and concurrence. If the Arizona SHPO does not concur with the design or intended treatment, the documents will be submitted to the Council for further comment. Comments of the

Arizona SHPO and the Council will be taken into account by NPS in planning the specific project.

5. NPS will develop, in accordance with NPS-28, as part of the Park's management plans, a long range, comprehensive maintenance program for the historic structures not removed pursuant to the Plan. A copy of the maintenance program plan will be developed within 24 months after the ratification of this Agreement and a copy of the document provided to the Arizona SHPO. Until NPS is prepared to initiate removal of those structures agreed upon in accordance with the terms of this Agreement and the Plan, it will ensure that all structures are maintained at least minimally to secure the public's and staff's safety and preserve the districts' historic appearances.
6. NPS will provide, for the Arizona SHPO's review, copies of the Assessment of Effect (XXX) form for projects affecting historic and cultural properties.
7. All development involving ground disturbance at the North Rim will be preceded by an archeological survey done in accordance with the Plan and applicable NPS cultural resource guidelines.

B. North Rim Headquarters Historic District:

1. New structures introduced to the district will be recognizable as products of their own time, but will be compatible to the district's significant characteristics. The significant characteristics of this district include, but are not limited to, historic association, a sense of time and place, scale and color.
2. NPS will inform the Arizona SHPO which specific structures will be removed from the district prior to effecting the action pursuant to stipulation A.6. above.

C. North Rim Inn and Campground Historic District:

1. NPS will produce an Historic Structures Report in accordance with NPS-28 for the North Rim Inn and provide a copy of the report to the Arizona SHPO.
2. The exterior of the Inn will be restored and the Inn's interior rehabilitated as defined in NPS-28. The time period and appearance of the exterior restoration will be based on the recommendations of the Historic Structures Report and in consultation with the Arizona SHPO.
3. NPS will inform the Arizona SHPO which specific structures will be removed from the district prior to effecting the action pursuant to stipulation A.6. above.
4. NPS will evaluate each of the structures scheduled for demolition for possible salvage and reuse of the structure or its parts in another portion of the North Rim.

D. Grand Canyon Lodge Historic District:

1. NPS, in consultation with the Arizona SHPO, will select for removal a limited number of regular log cabins to enhance visitor safety and quality of experience. The selective removal of cabins will be done in a manner that does not 1) alter the boundaries of the district, 2) destroy the present sense of clustering, and 3) alter the present sense of place created by the relationships of the clustered cabins and the views created from and of the cabins.
2. The criteria to determine which cabins may be removed are:
 - a. Provision of increased fire protection, e.g., cabins, which, due to their proximity to the canyon rim or each other, cannot be reached by mechanized fire suppression equipment present at the Park.
 - b. Provision of increased visitor safety, e.g., certain cabins are positioned too closely to the canyon rim to permit unsupervised visitor usage.
 - c. Enhancement of privacy and aesthetic values, e.g., removal of those cabins whose proximity to other units results in a denegation of privacy and quality of visitor experience.
 - d. Enhancement of future maintenance, e.g., removal of cabins which are deteriorated to the point that repair is not prudent or feasible or whose proximity to other cabins prevents accessibility by maintenance equipment.
3. NPS will evaluate each of the structures selected for demolition for possible salvage and reuse of the structure or its parts in another portion of the North Rim.
4. NPS will provide the Arizona SHPO and the National Register with an Addenda to the National Register form when the cabins have been removed.

E. Failure to carry out the terms of this Agreement requires that NPS again request the Council's comments in accordance with 36 CFR Part 800. If NPS cannot carry out the terms of the Agreement, it will not take or sanction any action or make any irreversible commitment that would result in an adverse effect with respect to National Register eligible properties covered by the Agreement or would foreclose the Council's consideration of modifications or alternatives to the undertaking covered by this Agreement that could avoid or mitigate the adverse effect until the commenting process has been completed.

F. If any of the signatories to this Agreement determines that the terms of the Agreement cannot be met or believes that a change is necessary, the signatory will immediately request the consulting parties to con-

sider a amendment or addendum to the Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement.

Execution of the Memorandum of Agreement evidence that the National Park Service has afforded the Council a reasonable opportunity to comment on the Comprehensive Design Plan, North Rim, Grand Canyon National Park and its effect on historic properties and that the National Park Service has taken into account the effects of its undertaking on historic properties.

Leland H. Chapman 11/1/82
Regional Director, Western Region, NPS Date

Ann D. Pitzlaff 12/3/82
Arizona State Historic Preservation Officer Date

Robert Dawsey Dec 30 1982
Executive Director, ACHP Date

Alexander Aldrich 1/8/83
Chairman, ACHP Date

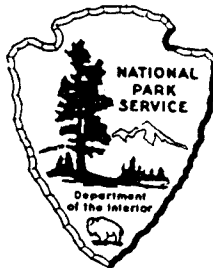
APPENDIX C

FISH AND WILDLIFE SERVICE SPECIES LISTING

LIST OF PREPARERS

REFERENCES

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APPENDIX C



UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

2-21-90-I-181

June 20, 1990

MEMORANDUM

To: Associate Regional Director, Resources Management and Planning,
Western Regional Office, National Park Service, San Francisco,
California

From: Acting Field Supervisor

Subject: Endangered and Candidate Species List

This memorandum is in response to your June 12, 1990 request for federally listed and candidate species that may occur in the area of a proposed expansion of visitor facilities at the North Rim of Grand Canyon National Park, Coconino County, Arizona.

Our records indicate the following species may occur in the project area:

American peregrine falcon (Falco peregrinus anatum)- Endangered
Cliff milk vetch (Astragalus cremnophylax var. myriorraphis)-
category 2
Grand Canyon rose (Rosa stellata)- category 2
Kaibab bladderpod (Lesquerella kaibabensis)- category 2
Kaibab paintbrush (Castilleja kaibabensis)- category 2
Mexican spotted owl (Strix occidentalis lucida)- category 2,
currently under petition for listing
Spotted bat (Euderma maculatum)- category 2

If we can be of further assistance, please contact Sue Rutman or Sam F. Spiller, Field Supervisor (Telephone: 602/379-4720 or FTS 261-4720).

Sally E. Stefferud

cc: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico
(FWE/HC)
Superintendent, Grand Canyon National Park, Grand Canyon, Arizona
(Attn: Resources Management Division Chief)

LIST OF PREPARERS

NATIONAL PARK SERVICE

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Peter Rowlands, B.A., M.A., PhD. Biology, Chief of Resources, Grand Canyon National Park -- Natural resources information

Zehra Osman, B.S. Natural Resources and Environmental Design, M.A. Landscape Architecture, Park Landscape Architect, Grand Canyon National Park -- Development of alternatives

Debbie Campbell, B.S. Civil Engineering, P.E. Colorado, 1982, Environmental Engineer, Denver Service Center -- Water and sewage systems information

REFERENCES

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